Proceedings of the Scoping Meeting

on

Sustainable Aquaculture for Poverty Alleviation

SAPA

MAY 23-25, 2000

Ministry of Fisheries, Hanoi, Vietnam.

Report prepared by:

Network of Aquaculture Centres in Asia-Pasific (NACA)
Suraswadi Building
Department of Fisheries
Kasetsart University Campus
Ladyao, Jatujak
Bangkok 10900
Thailand
Tel: (662) 561 1728 (to 29)
Fax: (662) 561 1727
E-mail:naca@enaca.org
http://www.enaca.org

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List of Acronyms

ACIAR	Australian Centre for International Agricultural Research
ADB	Asian Development Bank
AIT	Asian Institute of Technology
CPG	Cooperation Planning Group (Donors/MOFI)
DANIDA	Danish International Development Agency
DARD	Department of Agriculture and Rural Development
DFID	Department for International Development (United Kingdom)
DOFI	Department of Fisheries
DOSTE	Department of Science, Technology and Environment
DOLISA	Department of Labour, Invalids and Social Affairs
EIA	Environmental Impact Assessment
FAO	Food and Agriculture Organization of the United Nations
GDP	Gross Domestic Product
GSO	Government Statistical Office
HEPR	Hunger Eradication and Poverty Reduction strategy (of the Government of Vietnam)
ICD	International Cooperation Department (MOFI)
IDRC	International Development Research Centre
ISU	Implementation Support unit
LHA	Livelihood Analyses
MARD	Ministry of Agriculture and Rural Development
MOET	Ministry of Education and Training
MOFI	Ministry of Fisheries
MOSTE	Ministry of Science, Technology and Environment
MOLISA	Ministry of Labour, Invalids and Social Affairs
MPI	Ministry of Planning and Investment
NACA	Network of Aquaculture Centres in Asia-Pacific
NORAD	Norwegian Development Agency
OXFAM	An International Non-Governmental Organisation
PWG	Poverty Working Group (WB)
RIA No.1, No.2, No.3	Research Institute for Aquaculture No.1, No.2 and No.3
SAPA	Sustainable Aquaculture for Poverty Alleviation
SPS	Sector Programme Support
SIDA	Swedish International Development Agency
UNDP	United Nations Development Programme
VND	Vietnamese Dong (currency)
VSO	Voluntary Services Overseas
WU	Women Union

Background

Vietnam has large numbers of poor people whose livelihoods depend in various ways on aquatic resources. More than 20 million people living along the coastline are among the most vulnerable and poorest in Vietnam and similarly poor situations occur with more than 10 million population living in mid and highland areas throughout the country. The Government of Vietnam is giving high priority to the poverty alleviation and following several successful government and donor funded projects, it is recognized that aquaculture can and should play an increasingly important role in improving the livelihoods of poor people.

In support of the Government objectives for poverty alleviation, the Ministry of Fisheries (MoFI) hosted a Scoping Meeting on "Sustainable Aquaculture for Poverty Alleviation" (SAPA), in Hanoi from the 23rd-25th May 2000. The meeting was held to review the role of aquaculture development (in freshwater, brackish water and marine environments) in poverty alleviation and hunger eradication in Vietnam, to identify strategies for the more effective application of aquaculture to poverty alleviation, to review a draft framework for a program on sustainable aquaculture for poverty alleviation (SAPA) and to prepare an appropriate action plan to follow up from the meeting.

The workshop was attended by over 100 participants representing various stakeholder groups, including participants, from central government agencies, different provinces throughout the country, social organizations, farmers and donor agencies. This report provides a summary of the proceedings, and the papers submitted by the participants to the meeting.

The workshop participant list and program are given *Annex 1* and *Annex 2* respectively and a more detailed background paper on SAPA scoping meeting is provided in *Annex 3*.

Summary of Scoping Meeting Sessions

Session 1: Opening Session

Chairpersons: Dr. Nguyen Viet Thang, MoFI and Mr. Lai Quang Thuc, MPI
Reporters: Dr. Trinh Truong Giang, CAF, Dr. Michael Phillips, NACA

The scoping meeting was opened with welcome remarks from Dr. Ta Quang Ngoc, Minister, Ministry of Fisheries (MOFI), Vietnam. The Minister emphasized the importance of aquaculture for poverty alleviation in Vietnam and of the meeting in assisting the Ministry of Fisheries orienting its policy towards poverty alleviation.

Mr. Lai Quang Thuc, Vice Minister, of the Ministry of Planning and Investment informed that the Government was giving more attention to aquaculture as a tool for poverty alleviation, and expressed his full support to the objectives of the meeting.

A speech on the Status and Reasons of Poverty in Vietnam was provided by Mr. Nguyen Ha Huu, Director of the governments "Hunger eradication and poverty reduction program" of Ministry of Labour, Invalid and Social Affairs (MOLISA). Mr

Hieu broadly informed the participants of the government policies towards poverty alleviation in Vietnam.

Dr. Nguyen Viet Thang, Vice Minister, Minister of MOFI briefed the meeting on the overall priorities of the government towards poverty alleviation. He said that the Ministry wanted to give a higher priority to poverty alleviation within its programs, and emphasized that the meeting was important for the government in developing effective strategies for poverty alleviation through aquaculture.

Following these opening speeches, Dr. Le Thanh Luu, Vice-Director of Research Institute for Aquaculture No 1 (RIA1), provided a detailed briefing on the overall objectives and expected outcomes of the meeting. Further information on these objectives and a draft version of the SAPA document is provided in *Annex 3* and *Annex 4*. The other speeches from the Opening Ceremony are given in *Annex 5*.

Session 2: Overview Session

Chairperson: Dr. Nguyen Viet Thang, MoFI
Reporters: Dr. Trinh Truong Giang, UAF and Dr. Michael Phillips, NACA.

The overview session included several presentations on the poverty situation in Vietnam, and the role of aquaculture in poverty alleviation. The following speeches were provided.

- Livelihood status and needs of inland and coastal communities in relation to aquaculture by Dr. Tran Mai Thien, Director, RIA1
- Potential of aquaculture for poverty alleviation in Vietnam by Mr. Tran Van Quynh, MoFI
- Analysis of institutional arrangements for aquaculture development related to poverty alleviation – Dr. Le Thanh Luu, RIA1; Mr. Pham Gia Truc, FAO
- Past, ongoing and pipeline technical assistance (multi- and bilateral donors and Government) for aquaculture related to poverty alleviation. - Dr. Vu Van Trieu, MoFI (paper read by Dr. Le Thanh Luu)
- Women in aquaculture - Mdm Nguyen Thi Vang, Hai Duong Women's Union
- Health management and risk reduction in small-scale aquaculture - Dr. Rohana Subasinghe, FAO-HQ, Rome

Full papers from the presenters and resource persons are given in *Annex 6*. Following these presentations the plenary session was opened for discussion, during which the following major points were raised:

- The need for a list of relevant donor and government projects to be prepared and made widely available to promote information exchange.

- The limitations to poverty analysis based on the macro-regional basis. There are many smaller 'pockets' of extreme poverty, within rich communes, which are not reflected in this analysis.

- Government has selected a large number of communes for addressing poverty problems. The relation between SAPA and the commune level framework needs

to be clarified. It was suggested to undertake a poverty oriented approach in all provinces where aquaculture can play a role.

- There is a need for better statistics on the potential for poverty alleviation through aquaculture. In some mountain communes, 40-50% of households may have ponds, offering very significant potential for poverty alleviation based on existing resources.

- Government 113 and 135 programs on poverty alleviation have also focused on aquaculture.

- The focus on support from donors should be at the provincial level.

- The University of Fisheries, Nha Trang and other education institutes should be assisting in poverty alleviation through focused training and education of students. This is an important issue to be addressed.

- Environmental deterioration is a major problem in coastal areas, which will become more serious in the future.

- Aquaculture has received less attention by Government and donors within poverty alleviation programs and projects than agriculture.

Session 3: Donor Support Policies

Chairperson: Dr. Le Thanh Luu, RIA-1
Reporters: Dr. Tran Thi Luyen UoF, Mr. Niels Svennevig, SINTEF

Session 3 included short statements on policies, strategies and experiences of donors in poverty alleviation. Presentations were given by the United Nations Development Program, ACIAR, DANIDA, IDRC, NACA and NORAD.

Dr. Barney Smith, ACIAR informed that the aim of ACIAR was to facilitate research partnerships between Australian scientists and mainly developing countries focusing on poverty and natural resource management. Key terms are joint ownership and mutual benefits, commitment and funding. Aquaculture is of considerable importance in the fisheries program including issues like domestication, feed, disease diagnosis and prevention, reduction of adverse environmental impact, low-cost mariculture and possibly sea ranching. A 3-year consultation for new activities with Vietnam has just been completed.

Ms. Jeaninike Dahl Kristensen, DANIDA. Poverty issues have been in focus since 1993 and is often put into crosscutting context like gender, human rights etc. Bilateral aid is concentrated in 20 countries including Vietnam. There will be a change in future assistance. The objective will still be poverty directed – but it will address crosscutting issues like food security, nutrition level, HIV/AIDS in a multidisciplinary fashion e.g. the later issue will not only be looked upon from a health aspect.

Mr. Odd Toven, Norwegian Embassy. Present cooperation with Vietnam is following a MoU signed in 1996. During the bilateral meeting in March, 2000 cooperation within oil, energy and fisheries (incl. aquaculture) have been given priority. In the

assistance to Vietnam NORAD is strongly emphasizing a Vietnamese ownership together with a cooperation with other donors.

Dr. Dilip Kumar, from NACA, introduced the developing regional FAO/NACA program on aquaculture for rural livelihoods, which would assist countries within Asia in promoting aquaculture for poverty alleviation. The SAPA initiative fits well within the overall objectives of the regional program and should be a national focal point.

The donors and foreign technical agencies expressed a strong interest in the subject of the meeting. A list of international supported projects in fisheries and aquaculture in Vietnam is given in *Annex 8*.

Session 4: Working Group Sessions

Inland and freshwater aquaculture session facilitators: Dr. Tran Mai Thien, RIA1, Dr Graham Haylor, DFID, Bangkok
Reporters: Mr. Nguyen Hung Dien, RIA3, Nha Trang, Dr. Harvey Demaine, AIT, Bangkok

Coastal and marine aquaculture session facilitators: Dr. Nguyen Van Hao, RIA2, Dr. Barney Smith, ACIAR, Australia
Reporters: Dr. Nguyen Thanh Phuong, Can tho Univ.
Dr. Berit Aasen, Norwegian Urban and Regional Research Institute, NURRI

In Session 4, the meeting split into two working groups, one on inland and freshwater aquaculture and a second group on coastal and marine aquaculture. Dr. Le Thanh Luu, team leader of the working groups, provided the introduction to the working procedures and expected outputs. Session 4, was the largest session and provided greatest scope for participation.

The groups were requested to share experiences, discuss opportunities, and consider a framework for future actions. Discussion sessions were based around 3 sets of questions:

- Is aquaculture appropriate for poverty alleviation?
  - What recommendations exist?
  - What has been tried?
  - What works? –Evidence for this? (Key examples of technologies and processes in aquatic resources management that have been demonstrated to benefit the livelihoods of poor people)
- How can knowledge dissemination be improved?
  - What is the current system? (What communication and learning processes are used, what extension approaches)
  - How are poor people involved? (Are there mechanisms to link stakeholders to policy decisions)
- Where and what are the needs?
  - Who and where are the poorer more vulnerable populations, which could benefit from SAPA? (Consider location, gender, and livelihoods)
  - What are poor peoples' objectives? (What do people want?)

What are poor peoples' needs? (Consider other stakeholders, incentives, rules-of-the-game, and policy. Is there multi-sectoral co-ordination in policy formulation and at the point of service extension?)

Experience papers prepared on different aspects of aquaculture and poverty alleviation informed the discussions in each group (*Annex 6* and *Annex 7*).

Session 5: Conclusions and Recommendations of the Scoping Meeting

Chairperson: Dr. Nguyen Viet Thang, MoFI
Reporters: Dr. Michael Phillips, NACA and Mr. Niels Svennevig, SINTEF

Presentation of Session Working Group Reports

During this final session, the two working groups presented their findings at a plenary, followed by a discussion. The summary below merges the findings of the working group discussions and recommendations, incorporating also the comments given during the plenary session. The reports prepared by each of the working groups are given in *Annex 7*.

Aquaculture as a tool for poverty alleviation?

The freshwater working group considered that, with many examples throughout the country, small-scale, freshwater aquaculture was highly appropriate for poverty alleviation in rural communities. It did not spend time discussing this issue.

The coastal working group considered that coastal and marine aquaculture can be appropriate for improvement of livelihoods and poverty alleviation. However, there was less experience in poverty alleviation through coastal aquaculture and even less through marine aquaculture, since it is so scarcely developed. Therefore there is a need for better understanding of the social interactions and appropriate management practices and farming systems. Most experience to date is with shrimp pond culture – including alternate/mixed-farming systems, such as freshwater prawns or alternate cropping of shrimp with rice. It seems as if diversification into mixed agriculture/aquaculture was more successful in some southern districts that if farmer diversified into fruit production due to more open market demand. Other examples of coastal/marine aquaculture systems involving poor people include seaweed farming, fish (tilapia) pond culture, marine fish cage culture, lobster, and mud crab culture, mollusc farming. As coastal/marine aquaculture involves a wide spectrum of species and farming systems, from very low input systems (e.g. molluscs) to high investment farms (such as intensive shrimp), there is a need to identify, which species/farming systems are appropriate for the poor.

In coastal areas, the importance of interventions to contribute to reductions in risk to poor households was emphasized.

What is the current system for knowledge dissemination?

There was concern that there should be a clear policy for aquaculture extension for poverty alleviation. Although an extension system exists for coastal areas (DOFI), this is not the case for inland provinces, which have no dedicated unit responsible for aquaculture. Anyhow at the provincial level the extension system is variable and often very limited.

Ideally, the Ministry of Fisheries should create a countrywide extension structure. However, Decree no.13 specified that aquaculture extension is included in the remit of Ministry of Agricultur and Rural Development, but Government policy on cutting manpower currently prevents the establishment of aquaculture extension.

Even if such a system could be established there are human resource constraints. Because of the lack of career opportunity students are currently discouraged from following degree programs in aquaculture.

Whilst Provincial level aquaculture extension exists in coastal provinces, at village and district levels have a limited extension network, and currently reliance is placed on alternative approaches, the coastal group also considered there is differential access to extension, and the poor seem to be particularly disadvantaged as they often are not even involved in aquaculture. There seems to be a consensus between both groups that more effective extension systems tailored to meet the needs of poor people are required.

How can knowledge dissemination be improved?
It would be good if members of social organisations could be trained in social (gender awareness, communication skills) and technical issues as grass-root extension workers (via a "Training of Trainers"). However, it was stressed that the same information should be disseminated through many different channels/modes, including formal training use of mass-media distribution of leaflets and exchange visits. Training materials should be simple and visual.

The coastal group noted that many existing extension messages in coastal aquaculture were technology driven, and less likely to service the requirements of poorer farmers. Extension messages tailored to needs and understanding of the farming system, and developed from a farmer perspective, were required. It was also noted that knowledge requirements could vary substantially; for example, requirements of fishing households were different from farming households. Such differences have to be considered in an extension program focused on poor people.

In coastal areas, discussions focussed on improving knowledge dissemination in various ways, including building on existing extension/community information dissemination systems, cooperation among various agencies, use of farmer groups and collaboration with women's groups to address women's issues in aquaculture.

How are poor people involved?
"End users" can influence the research underlying extension messages if the approach involves Participatory Rural Appraisal type assessments of need at commune level. It may be possible to integrate such assessment with other programs. Whilst responsibility for facilitating such assessments could lie with any organisation with relevant capacity and commitment it was felt that social organisations (Vietnams Women's Union, Farmer's Assosiations and Youth Unit) were ideally suited to this role because of their grass-roots presence.

Linkages between the research, education and extension system appear to be very limited at the present time, and the general consensus was that research and

educational institutions are still weak in supporting extension workers. Research and extension institutions in coastal areas generally target better off farmers, leaving poorer groups poorly serviced.

Is there a mechanism for poor people to influence policy?
Several examples of locally effective mechanisms were discussed by the coastal group, but no input at higher levels of aquaculture policy development seemed to have resulted. The discussion suggested a general need to provide for a clearer policy focus on poor people in aquaculture development. Mechanisms to ensure active involvement of poor people in planning and implementation of coastal aquaculture projects are required.

Where and what are the needs?
It was agreed that analysis of people's needs and livelihood goals are crucial. It was recognised that while a broad front analysis was necessary there was general agreement that in Vietnam aquaculture was an appropriate entry point to livelihood improvement, because of low investment costs and quick returns.

It was agreed that such analysis should be oriented to helping farmers (and potential farmers) analyse reasons for poverty and finding possible solution. Those concerned should be skilled both in facilitation of this process and in the technical options. It was considered that the social organisations and agricultural extension workers should work together as a team. Where no technical aquaculture specialists exist, other extension workers could be trained.

It was agreed that capacity building in livelihoods approaches is required at all levels.

Policy and institutional arrangements
The development of the approach at the grass-roots level needs to be complemented by a key policy change. At Government level MOFI needs to make a case for:

- Clarification in water-use policy,
- Establishment of micro-finance facilities and subsidies for aquaculture
- Policy change in relation to extension, specifically a clearly defined framework for the relationship between MOFI and MARD.

In coastal areas, policy objectives for coastal aquaculture development need to be clearer, with reference to economic, social and environmental aspects. A social objective for aquaculture development (e.g. employment, alleviation of poverty) might lead to a quite different approach than development driven purely by economic or export objectives.

- There is a need for a pro-poor focus in policy formulation involving aquaculture, at all levels of government.
- A need for a strategic plan for using coastal/marine aquaculture as a tool in contributing to poverty alleviation was recognized.
- There is a need for better tools and capacity for planning at site/local areas and macro-level. In particular, greater emphasis was required on participatory planning involving poor people.

- The importance of development of aquaculture within the context of integrated coastal area management projects was identified, although experience in that particular subject in Vietnam appears to be limited. Links between SAPA and integrated coastal area management initiatives should be investigated.

MOFI needs to demonstrate its own commitment to the SAPA program by giving it prompt formal approval and submitting it to the Government, committing financial resources and creating appropriate organisational structures to manage and implement the program.

A (interim) steering committee should be formed that includes membership from other related ministries (MPI, MOSTE, MARD), and key donor agencies to further facilitate the development of SAPA.

Geographical target areas for SAPA
It was recognised that focus should be given the poorest communes where there is potential for aquatic resource development s.a. in the northern mountains, central plateau and coastal provinces. Provinces in other regions may follow the same approach through access to alternative resources.

In coastal areas, it was considered that poor landless fishing households, of which there are several million, should be a primary target for SAPA. Historical evidence on whether fisher families are willing to enter aquaculture should be documented. The Government should develop a policy to provide alternative livelihoods to this vulnerable group, and aquaculture seems to be one of the few viable alternatives. Other poor target groups could include fishermen involved in illegal fishing; poor farm households near the coastal area, many of whom have very limited and poor agricultural land; households living within or around major lagoons; salt farmers, as the price of salt is low and there is a need to secure better livelihood; households in or near mangrove areas; and fishermen in areas of high marine biodiversity. Women have an important role in coastal/marine aquaculture and should be considered as part of the livelihood analysis, and a policy to promote the beneficial role of women in coastal aquaculture should be established.

Developing recommendations for SAPA
It was agreed that SAPA is highly appropriate and that its objectives and main components were suitable. The next steps in development of SAPA should be:

- Collate the information from the scoping meeting and identify remaining information gaps. Some case-study evidence was presented on the impact of small-scale aquaculture on the rural poor. A fuller explanation of hard evidence from relevant programs (especially with wider than single village context) should be assembled to properly illustrate the case for poverty alleviation.
- Develop an approach (involving the provinces, beginning with participatory assessments, the development of an extension process which might involve peoples organisations, other ministries)
- Identify capacity building needs to implement the approach
- Develop a strategy document and raise awareness and promote in central government MPI and MARD, provincial Peoples' Committees, mass organisations VWU, FU, the banking sector VBP, VBA, etc

Further steps for development of SAPA should include:

- Select a number of pilot locations (based on poverty characteristics and aquatic resource potential) to test and refine the process based on the priorities of poor people
- Facilitate broader adoption of the approach through information and insights from the local level pilots

Whilst much discussion was focused on the role of government, plenary discussions noted that most investment in coastal aquaculture was from the "private" sector (*i.e.* mostly non-government, at different levels of investment depending on the scale of operation). The subsequent discussions emphasized the importance of engaging all potential groups including the private sector, civil society, and government in SAPA. After the group presentations Vice Minister Dr. Nguyen Thi Minh commented on the findings. She emphasized that it was important to address the issue of poverty alleviation through aquaculture as a common approach covering inland and coastal regions. Focus in the process should be given the immediate future steps to develop the SAPA. When addressing technology issues it was important to use the appropriate technologies, which would vary depending on the properties of the different areas. Likewise there is a need to develop specific policies for promoting aquaculture for poverty alleviation for the specific areas. The involvement of the local governments was important as they often have the ownership of the aquatic resources. Special organizational structure should be established in the provinces as well as ministerial level to promote aquaculture for the involvement of the poor.

Conclusions and Recommendations of the Scoping Meeting

Dr. Le Thanh Luu, Scoping Meeting Working Group team leader presented the draft of the conclusions and recommendations of the meeting. The following is the adopted version.

There is growing global recognition of the importance of aquaculture as a tool for improving livelihoods and alleviating poverty. The recent NACA/FAO Global Conference on Aquaculture in the Third Millennium, Bangkok has emphasized that aquaculture can be an entry point for improving livelihoods, planning natural resource use and contributing to environmental enhancement. Complementary initiatives are being developed at international, regional and national levels to promote and support the alleviation of poverty through aquaculture.

Recognizing the importance of aquaculture for poverty alleviation, and in line with these regional and international initiatives, the Ministry of Fisheries hosted the scoping meeting on "Sustainable Aquaculture for Poverty Alleviation", organized by the Ministry of Fisheries, on the 23rd-25th May 2000 in Hanoi. The participants, from central government agencies, different provinces throughout the country, social organizations, farmers and donor agencies, came together to review and exchange experiences on aquaculture for poverty alleviation, and develop effective strategies to increase the contribution of aquaculture to the alleviation of poverty in inland and coastal areas in Vietnam.

The meeting reiterated that Vietnam has large numbers of poor people, including fishing and farming households living in inland and coastal rural areas, and these populations need urgent assistance. The Government of Vietnam policy clearly recognizes the importance of improving the livelihoods of poor people in rural areas, and has taken up a number of initiatives to eradicate hunger and reduce poverty. Government further recognizes that alternative approaches are urgently needed to help the Government in reducing poverty, and there is now growing awareness that aquaculture can be one of the important alternatives.

The experiences presented and discussions during the plenary and working group sessions held during the scoping meeting clearly show that aquaculture is an appropriate approach which can be applied to the alleviation of poverty, and improvement of rural livelihoods. Furthermore, aquaculture can be an important entry point for improving people's livelihoods, and there was a broad agreement and interest among participants that aquaculture should be more widely applied to the alleviation of poverty in inland and coastal areas within the country.

Examples were provided where aquaculture has been successful in alleviating poverty, including freshwater fish culture in inland mountain areas, and brackish water and marine aquaculture in coastal environments. The importance of documentation and dissemination of successful experiences was strongly emphasized. A reference list of documents on povetry and aquaculture and fisheries in Vietnam can be seen in *Annex 9*.

The meeting then identified a number of important issues to address in making aquaculture a more effective means of poverty alleviation. Among the issues raised during discussions include:

- The poor knowledge base among farmers and fishers, and need to improve communication and dissemination of knowledge to target groups.
- The weak capacity among institutions at all levels, and the need to support capacity building to build poverty oriented approach to aquaculture development for poverty alleviation.
- The poor infrastructure to support aquaculture
- The need for policy development to give more attention to poverty in aquaculture.
- The need for more effective participatory planning of aquaculture development, and integration of aquaculture into coastal and inland rural development and management strategies.
- The need to analyze peoples need and better understand livelihood goals as a basis for identifying aquaculture interventions.
- The importance of cooperation among agencies involved in implementing and supporting poverty alleviation.

In some areas, especially in marine aquaculture, the meeting also noted that technologies and farming systems are poorly developed, and attention should be given to the further development of appropriate and low risk technologies and farming systems relevant to the needs of the poor people in coastal areas.

The meeting agreed that the SAPA framework on sustainable aquaculture for poverty alleviation is necessary. The meeting agreed with the objectives of the program. With

regards to the components, the meeting considered that priority should be given to the building capacity for poor communities. Other important components, which included the capacity building among supporting institutions, development and application of appropriate technology and farming systems, and raising of awareness and promotion of collaboration, should also be addressed. The meeting further emphasized that policy development should be given emphasis to support the objective of poverty alleviation through aquaculture.

It was agreed that the SAPA program should create awareness amongst all stakeholders (key government agencies, provincial administrations, social organizations, local people and the donor community) and at all levels.

The program, minimally, should also follow certain basic principles: targeting of poor communes with aquatic resource potentials, participatory needs assessment, involvement of local social organizations and local agricultural workers in an integrated approach to facilitation and implementation, especially in dissemination of technical information. This inevitably this requires the MOFI to co-operate closely with MOLISA, VWU, MARD, etc. It was further emphasized the target households should be the concentrated on the poorest communities where there is potential for aquaculture. Mountain and central highland, and coastal provinces should be given particular attention, and in coastal areas particular focus should be directed towards poor fishermen.

The participants emphasized the importance of urgent follow up from the scoping meeting. It was recommended that the program framework should be further developed, based on the papers at the meeting and the detailed recommendations coming from the two working groups, and the plenary discussions, in consultation with relevant stakeholders. Likewise the information gaps should be identified. Particular attention should be given to the collation of and dissemination of existing information, developing an approach for the program which will assist alleviation of poverty, identification of capacity building requirements, identification of pilot sites for SAPA, and facilitating a broader approach through information and insights from the local level pilots, and other issues raised during the working group and plenary discussions.

The importance of maintaining linkages with regional and global initiatives to improve livelihoods through aquaculture, including the developing FAO/NACA Asia regional program, was also emphasized.

Based on the findings, meeting participants suggested particular attention should be given to the development of a short policy paper to raise awareness about the special role of aquaculture in poverty alleviation to government policy makers, particularly in other sectors involved in rural development.

In this regard, and recognizing the importance of SAPA for alleviation of poverty within the country, the meeting requested to the Ministry of Fisheries to give early approval of SAPA, mobilize resources, and establish an appropriate institutional structure, to assist in its implementation. The meeting also recommended that a Working Group of the Ministry of Fisheries undertake the continued development of the SAPA framework, including the short policy paper, for submission to the

government for approval. Finally, the meeting further requested donors to cooperate and provide further support to the development and implementation of SAPA.

Closing Ceremony

The meeting was closed by Vice Minister, Dr. Nguyen Viet Thang, who thanked the participants for their active work and preparation of useful conclusions and recommendations from this important meeting. He assured that the Ministry of Fisheries would follow up from the meeting and allocate resources within the year 2000 for the most urgent follow up. He informed that a strategy paper would be prepared for Government, in order to formalize SAPA. He requested that donors give consideration to support for SAPA in their country assistance programs. In closing he thanked the participants for their cooperation and wished everyone a good journey home. The full speech of Dr Thang is given in *Annex 5*.

Follow-up to the Scoping Meeting

Shortly after the meeting, MOFI established an 8-person task force group to assist in finalising the SAPA strategy document (as presented in *Annex* 4). The task force group consisted of members from the organisations and institutions namely: MOFI, RIA1, University of Fisheries, University of Can Tho, NORAD, DFID, NACA and AIT-Outreach. Furthermore, a support group was established to support the development of the SAPA strategy document. In September 2000, a workshop was held by MOFI, involving the task force and some members of the support group, that finalised the SAPA strategy document.

List of Annexes

Annex 1: List of Participants

Ministry of Fisheries (MOFI)

1. Dr. Nguyen Viet Thang, Vice Minister
2. Mr. Tran Van Quynh, Dept. of Science and Technology
3. Dr. Tran Mai Thien, RIA1
4. Dr. Vu Van Trieu, Dept. of International Collaboration
5. Dr. Le Thanh Luu, RIA1
6. Dr. Nguyen Van Hao, RIA2
7. Dr. Ha Xuan Thong, Institute of Fishery Economic and Planing
8. Mr. Nguyen Huy Dien , UNDP/MOFI/RIA1
9. Mr. Nguyen Van Vuong, Government project, RIA1
10. RIA-3 representative (Prof. Dien)
11. Mr. Nguyen Van Nhuong, RIA1
12. RIMP representative (Khung)

Ministry of Education and Training (MOET)

13. Dr. Nguyen Thi Luyen, Fisheries University
14. Mr. Le Anh Tuan, Fisheries University
15. Mr. Le Thanh Hung, CAF
16. Mr. Nguyen Thanh Phuong, Can tho University
17. Dr. Nguyen Van Phap, Hue University

Ministry of Planning and Investment (MPI)

18. Mr. Nguyen Xuan Thao, Vice Minister
19. Dept. of International Collaboration representative
20. Dept. of Agriculture and Rural Development representative

Ministry of Foreign Affairs

21. Representative

Ministry of Agriculture and Rural Development

22. Representative
23. Dept. of Agriculture Extension representative

Ministry of Science, Technology and Environment (MOSTE)

24. Representative
25. Oceanographic Institute, Hai Phong representative

Ministry of Labor, Invalid and Social Affairs (MOLISA)

26. Representative
27. Dept. of Poverty Alleviation representative

Provinces

28. Woman Union, Quang ninh representative
29. DoFI, Hai Phong representative
30. Mr. Hoang Dinh Yen, DoFI, Quang binh
31. DoFI, Khanh Hoa representative
32. DoFI, Ben Tre representative

33. DARD, Hoa Binh representative
34. DoFI, Binh Dinh representative
35. DARD, Bac Giang representative
36. DARD, Ha Giang representative
37. DoFI, Ha Tinh representative
38. DoFI, Soc Trang representative
39. DoFI, Nghe An representative
40. DARD, Bac Can representative
41. DARD, Dac Lac representative
42. DoFI, Thua Thien-Hue representative
43. DARD, Tay Ninh representative

Government Council Office
44. Representative

Vietnamese Women's Union
45. Representative
46. Ms. Tran Thi Dung, Committee for Women's Advancement

Committee for Ethnic Minorities
47. Representative

Foreign agencies in Vietnam; regional and international participants

United Nations Development Programme (UNDP)
48. Representative
49. Mr. Nguyen Thanh Tung, program officer

Food and Agriculture Organization of the United Nations (FAO)
50. Representative, Hanoi office
51. Mr. Pham Gia Truc, program officer, FAO
52. Dr. Rohana Subasinghe, FIRI, FAO, Rome

World Bank
53. Representative
54. Dr. Cao Thanh Binh, Program Officer

Asian Development Bank
55. Richard Elsie, Vietnam project

European Union
56. Representative

Australia and ACIAR
57. Dr. Barney Smith, ACIAR, Australia
58. Dr. Barry Clough, AIMS (based at NACA, Bangkok)

British Embassy and DFID
59. Embassy representative
60. DFID, Vietnam representative
61. Dr. Graham Haylor, DFID, Bangkok

Canadian Embassy, Canadian Funds and IDRC
62. Embassy Representative
63. Mr. Jack Buller, Canadian Funds
64. Ms. Nguyen Thi Thu Huong, Canadian Funds
65. Dr. Stephen Tyler, IDRC

Danish Embassy and DANIDA
66. Embassy representative
67. Mr. Torben Bellers, Counselor
68. Ms. Jeanineke Kristensen, DANIDA HQ
69. Dr. Frits Jepsen, DANIDA-SPS, Hanoi
70. Dr. Andreas Villadsen, DANIDA-SPS, SUMA, Hanoi
71. Ms. Susanne Thomsen, DANIDA-SPS, SUFA, Hanoi

Finish Embassy
72. Embassy representative
73. Finida representative

Italian Embassy
74. Embassy representative

Japan Embassy
75. JICA (Nha trang)

Norwegian Embassy, NORAD and Norway
76. Odd Toven. Embassy representative
77. NORAD, Hanoi representative
78. Ms. Kirsten Bjoru, NORAD HQ
79. Dr. Berit Aasen, Norwegian Urban and Regional Research Institute
80. Mr. Niels Svennevig, SINTEF F&A
81. Dr. Bjoern Hersoug, Norwegian College of Fisheries Science

Swedish Embassy
82. Embassy representative
83. Sida representative

Asian Institute of Technoogy
84. Dr. Harvey Demaine
85. Ms. Govind Kelkar

Mekong River Commission (MRC)
86. Dr. Zigmond Jeney (or representative)

Network of Aquaculture Centres in Asia-Pacific (NACA)
87. Dr. Dilip Kumar, Senior Aquaculturist
88. Dr. Michael Phillips, Environment Specialist

Non-government organizations based in Hanoi
89. World Wide Fund for Nature (WWF) representative
90. IUCN representative
91. Save the Children representative
92. Oxfam representative

Annex 2: Meeting Program

Tuesday, May 23rd 2000

0730-0830 Registration

Session 1: *Opening Session/ Government Policy for Poverty Alleviation.*
Chairpersons: Dr. Nguyen Viet Thang, MoFI and
Mr.Lai Quang Thuc, MPI
Reporters: Dr. Trinh Truong Giang, CAF and
Dr. Michael Phillips, NACA.

0830-0835 Introduction
Mr. Nguyen Ngoc Chung, MoFI

0835-0840 Welcoming remarks
Dr. Ta Quang Ngoc, Minister, MoFI

0840-0855 Opening address-Government Policy for poverty alleviation
Mr. Lai Quang Thuc Vice Minister, MPI

0855-0905 Status and reasons of poverty in Vietnam
Mr. Nguyen Hai Huu, Director of Hunger Eradication & Poverty Reduction, HEPR, Min. of Labour, Invalid and Social Affairs, MOLISA

0905-0920 Policy priorities in aquaculture development towards poverty alleviation
Dr. Nguyen Viet Thang, Vice Minister, MoFI

0920-0940 Objectives & expected output of scoping meeting
Dr. Le Thanh Luu, RIA1, Bac Ninh

0940-1000 Coffee

Session 2: *Overview Session*
Chairperson: Dr. Nguyen Viet Thang, MoFI
Reporters: Dr. Trinh Truong Giang, CAF and
Dr. Michael Phillips, NACA

1000-1020 Livelihood status and needs of inland and coastal communities in relation to aquaculture
Dr. Tran Mai Thien, RIA1

1020-1040 Potential of aquaculture for poverty alleviation in Vietnam
Mr. Tran Van Quynh, MoFI

1040-1100 Analysis of institutional arrangements for aquaculture development related to poverty alleviation
Dr. Le Thanh Luu, RIA1; Mr. Pham Gia Truc, FAO-Hanoi office

1100-1120 Past, ongoing and pipeline technical assistance (multi- and bilateral donors and Government) for aquaculture related to poverty alleviation.
Dr. Vu Van Trieu, MoFI (presented by Dr. Le Thanh Luu, RIA1)

1120-1140 Women in aquaculture
Mdm Nguyen Thi Vang, Hai Duong Women Union

1140-1200 Health management and risk reduction in small-scale aquaculture
Dr. Rohana Subasinghe, FAO-HQ, Rome

1200-1240 Floor discussion
1240-1400 Lunch

Session 3: ***Donor Support Policies***
Chairperson: Dr. Le Thanh Luu, RIA1
Reporters: Dr. Tran Thi Luyen, UoF and
Mr. Niels Svennevig, SINTEF Fisheries and Aquaculture.

1400-1500 Short statements on policies, strategies and experiences of donors in poverty alleviation from the following:
ACIAR, DANIDA, DFID, IDRC, NACA, NORAD, UNDP

1500-1510 Introduction of the Group Session Work Procedures and expected output of scoping meeting towards development of the "Sustainable Aquaculture Development for Poverty Alleviation in Vietnam " (SAPA) strategy.
Dr. Le Thanh Luu, scoping meeting Working Group team leader

1510-1530 Coffee

Session 4: ***Parallel Group Sessions***
The meeting will then split into two parallel group sessions:

(A) Experiences concerning livelihoods of people involved in inland/freshwater aquaculture and aquatic resources management projects

(B) Experiences concerning livelihoods of people involved in coastal/marine aquaculture and aquatic resources management projects.

1530-1730	**Participatory discussion with provincial stakeholders** *Is aquaculture appropriate for poverty alleviation? Where are the examples?*	
	Group Session A: Inland/freshwater Facilitators: Dr. Tran Mai Thien, RIA1, Dr Graham Haylor, DFID, Bangkok Reporters: Mr. Nguyen Hung Dien, RIA3, Nha Trang, Dr. Harvey Demaine, AIT, Bangkok	**Group Session B: Coastal/marine** Facilitators: Dr. Nguyen Van Hao, RIA2, Dr. Barney Smith, ACIAR, Australia Reporters: Dr. Nguyen Thanh Phuong, Can tho Univ. Dr. Berit Aasen, Norwegian Urban and Regional Research Institute, NURRI

	Resource persons/papers Group A	*Resource persons/papers Group B*
	Small-scale aquaculture in the Red river delta. Dr. Harvey Demaine, Dr Le Thanh Luu, AIT	Household adaptations in coastal economies. Dr. Berit Aasen, NURRI
	Rice fish culture-an economically effective approach for poor farmers. Mr. Nguyen Van Vuong and Mr Duong Van Khan, RIA1	Coastal aquaculture and poverty alleviation: opportunities and challenges: case studies in the north and north-central Vietnam Mr. Tran Van Nhuong, RIA1
	Project for women in aquaculture on reclaimed land in Ha An commune, Quang Ninh province. Ms. Nguyen Thi Voung, Woman Representative of Ha An commune. Mr. Jack Buller, Canadian Funds-Hanoi	Management strategies for improving livelihoods of households involved in mixed aquaculture-mangrove forestry in the Mekong delta. Dr. Barry Clough, AIMS, Australia (Bangkok) and Mr. Tran Thanh Xuan, RIA2
	Rural aquaculture extension in the Mekong river delta. Dr. Nguyen Van Hao, RIA2 and Dr. Nguyen Thanh Phuong, Can Tho University	Aquaculture and livelihoods of fishing communities in Tam Giang lagoon. Dr. Nguyen Van Phap, Hue University and Dr.Stephen Tyler, IDRC, Canada
	Extension in freshwater aquaculture for poverty alleviation in northern Vietnam Dr. Dilip Kumar, NACA	Coastal poverty projects and the experience of aquaculture in Quang Binh. Mr. Hoang Dinh Yen, DoFI, Quang Binh
	Aquaculture development in mountain provinces Mr. Nguyen Huy Dien, MoFI	Marine cage culture in Nha Trang: lessons for poverty alleviation Mr. Le Anh Tuan, UoF
	Aquaculture in midland of South East Vietnam. Dr. Trinh Truong Giang, CAF	Capacity building in marine aquaculture Dr. Tran Mai Thien, RIA1 and Mr Niels Svennevig, SINTEF F&A

1830-2000 Reception hosted by MoFI

Wednesday, 24th May 2000

0800-1800	**Participatory group discussion sessions with Provincial stakeholders** - *How is knowledge disseminated?* - *What are the successful examples?* - *How can knowledge dissemination be improved?* - *Where and what are the needs?* *Discussion on potential poverty alleviation program (SAPA)*	
	Group Session A: continued	**Group Session B: continued**
1000-1030	Coffee	
1215-1330	Lunch	
1500-1530	Coffee	
1830-2000	Dinner hosted by RIA1	

Thursday 25th May, 2000

Session 5: ***Conclusions and Recommended Follow Up Actions***
Chairperson: Dr. Nguyen Viet Thang, MoFI
Reporters: Dr. Michael Phillips, NACA, Mr. Niels Svennevig, SINTEF

0900-0940 Presentation of findings of the working groups

0940-1010 Floor discussion

1010-1040 Coffee break

1040-1120 Conclusions and recommendations
Dr. Le Thanh Luu, Scoping meeting Working Group team leader

1120-1135 Closing remarks by Dr. Nguyen Viet Thang, Vice Minister, MoFI

1200 Lunch

Annex 3: Background Information for Scoping Meeting

Background –The Rural Poor

Vietnam has large numbers of poor people living in inland and coastal rural areas, many with their livelihoods connected in various ways to aquatic resources. More than 20 million people living along the coastline are among the most vulnerable and poorest in Vietnam. Similarly poor situations occur with more than 10 million population living in mid and highland areas throughout the country. Incomes are low along north central coast and comparable to the poor north mountainous provinces[1]. Fishing communities in coastal areas are clustered among the poorest income strata of Vietnam and, as fish stocks declines, due to loss of nursing grounds and over-fishing, they face downward pressure on living standards and an unsustainable future[2]. Households dependent on agriculture in mountain and midland provinces face similarly difficult conditions due to limited availability of agriculture land, which tend to be poor and with low productivity. Due to overexploitation and loss of habitats, decline of inland fishery resources, widely used in the past by rural people for food, has harmed the livelihoods of poor rural communities.

The Government of Vietnam is giving high priority to poverty alleviation through improvement of livelihoods. Based on several successful projects, the Government now recognizes that aquaculture can and should play an increasingly important role in poverty alleviation. Therefore this Scoping Meeting on "Sustainable Aquaculture for Poverty Alleviation" is being organized by the Minister of the Ministry of Fisheries, MoFI in collaboration with Ministry of Planning and Investment, MPI.

Opportunities and Constraints

Aquaculture has demonstrated a potential for poverty alleviation, and provides a considerable opportunity for improvement of livelihoods in rural coastal and inland communities.

In coastal areas, opportunities for improving livelihoods and reducing the vulnerability of low-income families and land-less fisher families, forced in large numbers to leave inshore fisheries due to decreased fisheries, are in many locations closely linked to improved aquatic resource management, habitat rehabilitation and potentially introduction of low input – low cost aquaculture. Such interventions both within the sea, estuaries and on land, offer possible entry points for improving people's livelihoods.

Experiences for example in Nghe An, Quang Binh and Do Son have shown that aquaculture can help alleviate poverty and improve the livelihood of farmers and fishermen living in coastal areas. In Nghe An and Nam Dinh clam farming in shallow inshore waters provides social and economic benefits to poor, land-less fisher families and a low-cost as an alternative to the declined fisheries. In Nha Trang, also, land-less fisher families have benefited from involvement in small-scale marine fish cage

[1] According to GOV figures, monthly incomes per capita in the north central coast in 1994 were VND133,000; 1995- VND160,210 and 1996- VND174,040, and in the south central coast: VND144,720 ; VND176,030; VND194,660 respectively. For comparison, northern mountain provinces monthly incomes per capita were VND132,360 in 1994, VND 160,650 in 1995 and VND173,760 in 1996 (note: 1US$ approx VND14,000).

[2] UNDP (1998) Expanding choices for the rural poor: Human development in Vietnam.

culture. Indeed, there are proposals now to integrate small-scale marine aquaculture as an alternative livelihood option within a Biodiversity and Marine Protected Area Management Project in this coastal region. In the Mekong delta, improvements in the management and farming systems of mixed shrimp-mangrove farms have led to improvements in the livelihood of poor people living in the area, providing an alternative for poor people to cutting of mangrove forests.

An essential requirement is to place planning for near-shore fisheries and aquaculture in a rural development framework focussed on poverty reduction and reflecting the local resource base and priorities. Since there is very limited tradition in marine and coastal aquaculture, so far, no focus has been given to development of the appropriate technologies in this field and the planning of development.

In inland areas, there have already been several successful poverty alleviation case-stories involving aquaculture in the northern mountains. However, there are several constraining issues relating to wider expansion of these experiences and practices among the poor households. Most of the mountain and midland provinces have not separately established extension unit/center for aquaculture and aquatic resources management. This has negatively impacted the adequacy of both human resources and the effective implementation of any extension services activities.

The other issue is the lack of awareness in the population as well as policy makers of the potential of aquaculture for poverty alleviation and rural development. Although there are evidences of successful cases of aquaculture for poverty alleviation, the information flow to various stakeholders, from decision-makers and farmers has not been done in the appropriate way. It has led to a rather poor perception among stakeholders and decision-makers resulting in weak support from their sides.

Although, for the last decade, some technological interventions have been implemented between communities and research institutes, the gap between farmer's needs and existing capability of the institutions still remains a serious issue. The farmer's needs are quite diverse including higher effectiveness of the existing farming systems, quality and quantity of seed, development of new technology/systems leading to economic, environmental and social benefits, etc. Presently, the institution system is by far short of meeting these needs.

With a large number of poor people living in rural areas with livelihoods connected in various ways to the aquatic resource base and with government giving greater attention to aquaculture development and poverty alleviation, it is timely to look for effective strategies to alleviate poverty through aquaculture and improved aquatic resources management.

Government Policy for Poverty Alleviation

National policies in Vietnam are increasingly giving strong focus on poverty alleviation and the present proposed program fits well within this overall Government thrust. Government has given high priority to the aquaculture development sub-sector recognizing that aquaculture can be an effective and alternative source for poverty alleviation, rural development and food security. Since 1994 the Government has promoted a long-term program entitled 773 with the purpose to support the rural area to use potential areas (flooding fields, swamps, tidal flats) for aquaculture.

In a most recent annual review of the fishery sector, the Prime Minister (1998) emphasized the important role of aquaculture development in sustaining fish production. The PM considered aquaculture as an important but undeveloped sub-sector, which can alleviate poverty. His support recently resulted in the Government approval of a development plan for aquaculture for the period 2000-2010 as proposed by the Ministry of Fisheries.

Objectives of the Scoping Meeting

In support of the Government objectives for poverty alleviation, the Ministry of Fisheries, MoFI will host a Scoping Meeting with the support of NORAD with the following objectives:

1. To review the current status of aquaculture development (freshwater, brackish water and marine environments) and its contributions to poverty alleviation and hunger eradication.

2. To review current information available on the livelihood status of poor people in Vietnam, particularly poor households involved in aquaculture, agriculture and fishing.

3. To review and assess achievements of the past and on-going technical assistant projects and government funded programs for aquaculture and aquatic resources management, and their impacts on poverty.

4. To review and analyze experiences and identify opportunities for applying aquaculture and other aquatic resources development and management projects in alleviating poverty among people living in rural areas.

5. To review and analyze institution capacity in aquaculture and aquatic resources supporting poverty alleviation.

6. To initiate cooperation and dialogue among parties involved in aquatic resources management and aquaculture projects with a common interest in alleviating poverty and promoting sustainable livelihoods of rural peoples.

7. To discuss a draft program framework that will lead to formulation of comprehensive aquaculture program to support sustainable livelihoods improvements and reduce poverty.

8. To prepare a strategy/action plan to follow up from the meeting.

9. To develop a proposal and TOR for a program formulation mission.

Expected outputs from the Scoping Meeting are as follows:

1. Meeting proceedings which will include:

   - Status of aquaculture and its role in poverty alleviation in rural areas.

- Needs and opportunities for poverty alleviation through aquaculture and improved aquatic resources management.
- Review and exchange of achievements of the past, on-going and list of pipeline technical assistant projects and government programs in aquaculture.
- Experiences and success stories of aquaculture in different culture environments for poverty alleviation.
- Strategies used to disseminate knowledge from successful examples, and how such knowledge dissemination can be further strengthened.
- Recommend follow up actions to increase the impact of aquaculture and improved aquatic resources management on alleviation of poverty.

2. An understanding and awareness on required strategies and opportunities for planning and implementing aquaculture and aquatic resources management activities in ways, which contribute to improving livelihoods and poverty alleviation within a rural development framework. This will lead to a refocusing of government and donor support towards addressing sustainable livelihood issues in rural areas through the aquaculture sub-sector.

3. The start of improved (geographically and thematically) cooperation and coordination among parties involved in aquatic resources management and aquaculture projects with a common interest in alleviating poverty and improving livelihoods.

4. A prepared cooperative program framework for sustainable aquaculture for poverty alleviation to be discussed, further developed and agreed.

5. An action plan to follow up on the recommendations made by the meeting.

6. A comprehensive proposal for a program formulation mission with timetable for implementation, TOR and nominated mission members, eventually leading to a cooperative program for poverty alleviation through aquaculture in Vietnam is discussed and agreed.

The meeting proceedings including the papers presented, outcome from discussions, conclusions and follow up recommendations will be published for widespread distribution among government agencies and the donor communities in Vietnam and abroad.

Scoping Meeting Organization Arrangements

Organizing committee

The Ministry of Fisheries, MoFI will chair an organizing committee and the Ministry of Planing and Investment, MPI will be the Vice-chair of the Scoping Meeting.

The organizing committee consists of the following members:

Dr. Nguyen Viet Thang, Vice Minister, MoFI, Chairman
Mr. Nguyen Xuan Thao, Vice Minister, MPI, Vice-Chairman
Dr. Tran Mai Thien, Director, Research Institute for Aquaculture 1, RIA1, member
Dr. Vu Van Trieu, Vice-Director, Dept. of International Collaboration, MoFI, member

Mr. Tran Van Quynh, Vice-Director, Dept. of Science Technology, MoFI, member
Dr. Le Thanh Luu, Vice-Director, RIA1, Secretary
Dr. Tran Thi Dung, coordinator of Committee for Women Advancement, MoFI

The committee is responsible for all formalities, arrangements and logistics of the workshop. The committee will revise all materials, documents of the workshop before submission to the steering committee for comments and endorsement.

Working Group

The MoFI has appointed a working group for preparation materials for the Scoping Meeting. The members of the working group are:

Dr. Le Thanh Luu, RIA1, Team leader
Dr. Tran Mai Thien, RIA1, member
Dr. Vu Van Trieu, DIC, member
Mr. Tran Van Quynh, DST, member
Dr. Michael Phillips, NACA, Secretary
Mr. Niels Svennevig, SINTEF F&A, Secretary
Dr. Graham Haylor, ARMP, DFID
Mr. Nguyen Thanh Tung , UNDP

The working group met from 4th-14th April to develop the final agenda for the Scoping Meeting, preparation of general overviews, editing of meeting papers, preparing of a draft program framework and TOR of the program formulation mission to be discussed and further developed during the meeting.

The working group will be responsible for preparation of the proceedings and other relevant document for widespread dissemination to concerned persons and agencies. Four days will be allocated for the group to work after the meeting.

Steering Committee

A steering committee is established for the Scoping Meeting including the following persons:
Dr. Nguyen Viet Thang , Vice-Minister, MoFI , Chairman
Mr. Nguyen Xuan Thao, Vice-Minister, MPI, Co-Chairman
Dr. Le Thanh Luu, RIA1
Dr. Michael Phillips, NACA
Mr. Niels Svennevig, SINTEF F&A
Mr. Nguyen Thanh Tung, UNDP
Dr. Cao Thanh Binh, World Bank
Dr. Harvey Demaine, AIT
Mr. Odd Toven, Norwegian Embassy
Mr. Pham Gia Truc. FAO
Mr. Tran Trong Chinh, Norwegian Embassy
Mr. Andreas Villadsen, SPS, DANIDA
Dr. Tran Thi Dung, member of Committee for Women Advancement, MoFI
Mr. Torben Bellers, Danish Embassy
Dr. Govind Kelkor, Gender Research Program, AIT
Representative of the Ministry of Agriculture and Rural Development
Representative of the Ministry of Labour, Invalid and Social Affairs

The steering committee is responsible for giving advises to meeting organization, arrangements, logistics, meeting contents and presentation papers/reviews, and it is responsible for endorsing the meeting agenda, and relevant materials, documents prepared for the meeting.

Schedule of Activities, Venue of Meeting and Other Arrangements

The Ministry of Fisheries will host the Scoping Meeting under the technical support of RIA1 and financial support by NORAD at the Ministry of Fisheries, 10 Nguyen Cong Hoan, Hanoi from the 23rd-25th May 2000.

An invitation is sent by e-mail or fax to participants. Visa arrangements for foreign participants take place from 10th April onwards when receiving confirmation of participation and full passport details.

The working group will meet two days before Scoping Meeting to complete preparation work and continue for four days after the meeting to complete proceedings and all relevant documents for publication. The prepared proceedings and materials will be presented to the Steering Committee on 29th for approval.

Each speaker will be allocated 10-20 minutes for their presentation, which should focus only on the key points of relevance to the objectives of the Scoping Meeting. Each presentation should also be submitted as a paper when arriving. The issues to be covered are: socio-economy, capacity building at the appropriate level and institutional requirements to support the livelihood approach, appropriate technology and farming systems and also when possible give practical examples of success (or failure) of applying aquaculture for rural development, with a conclusion of lesson's to be learnt.

A tentative agenda is produced as a separate document.

Organizational Responsibilities

MoFI and MPI are responsible for invitation of participants and other matters relating to organization on this meeting.

NACA and SINTEF Fisheries and Aquaculture will nominate two staff to assist in preparation and implementation of the meeting.

RIA-1 will help the organization committee in application of visa for foreign participants and logistics including transportation.

Action Plan for Follow-up from the Scoping Meeting

The Scoping Meeting will also adopt an 'action plan' to follow up and maintain momentum generated by the Scoping Meeting. It is expected that immediate follow up actions will involve:

- Third meeting of the working group will be held on 26th-29th May. The working group will complete proceedings and all relevant documents for publication. The prepared proceedings and materials will be presented to the Steering Committee on 29th for approval.
- Preparation for publication of the proceedings from the Scoping Meeting (*Responsibility: RIA1*).
- Establishment by MoFI of an 'interim' Sustainable Aquaculture for Poverty Alleviation (SAPA) program committee, with representation of stakeholders.
- Collection of information to prepare for the Program Formulation Mission, and to fill any missing gaps in information identified by the Scoping Meeting (*Responsibility: to be decided by 'interim' SAPA program committee*).
- Initiate Program Formulation Mission, tentatively scheduled for June-July 2000. The detailed Terms of Reference for the Program Formulation Mission are provided in a separate draft program document to be reviewed during the Scoping Meeting. (*Responsibility: MoFI*)
- Drafting of SAPA Program Document. (*Responsibility: Program Formulation Mission under MoFI in consultation with 'interim' SAPA program committee*).
- Other priority actions as decided during the meeting.

Annex 4: The SAPA Strategy Document[1]

Executive Summary

There is general agreement amongst Government and many donors that aquaculture and improved aquatic resources management can make a significant and direct impact on poverty reduction and hunger eradication in Vietnam. The key policy issue is to better support poor and vulnerable groups who depend on or could make use of aquatic resources through the use of the livelihoods perspective. To address this issue MOFI has prepared this "Sustainable Aquaculture[2] for Poverty Alleviation" strategy – the SAPA Strategy.

The SAPA Strategy recognises that there is a need for: awareness raising and better communication of the role of aquaculture and aquatic resources in sustaining poor people's livelihoods in Vietnam, for improved understanding of participatory approaches, improved institutional capacity with a pro-poor focus; addressing the gap between farmers/fishers needs and the services offered by extension institutions; appreciating the wide range of stakeholders involved in aquatic resource management, and addressing the issues of access to markets and financial services by the rural poor.

In response to these issues, the SAPA Strategy is formulated to contribute to the goal of poverty alleviation within the Government "Hunger Eradication and Poverty Alleviation" strategy. The purpose is to enhance the livelihoods of poor and vulnerable people through aquaculture with the following outputs: (1) Capacity of institutions strengthened, particularly local institutions and communities, to understand and support livelihood objectives of poor and vulnerable people who depend on or who could benefit from aquaculture; (2) Access improved for poor people, to materials, information, financial and extension services and markets; (3) Communication improved amongst stakeholders[3], through awareness raising and knowledge sharing, networking, inter-sectoral/sectoral and donor co-ordination, introduction of participatory planning, implementation, monitoring and evaluation approaches and informing policy development; and (4) Environmentally friendly, low-risk, low-cost aquaculture technologies and management practices developed and adopted.

The primary target group of SAPA is poor people in rural areas where opportunities exist to diversify and improve livelihoods through aquaculture. Special attention will be given to the most vulnerable groups. In terms of spatial attention, the first focus will be on the Northern Mountains, Central Highlands, North Central Coastal provinces and the Mekong Delta. Moreover, links will be pursued with district, provincial, national and regional institutions and donor agencies with responsibilities for poverty alleviation and sustainable rural development.

The SAPA Strategy emphasizes a process approach and will build further on the understanding derived from sustainable livelihood analyses and local pilots. For the implementation, SAPA will be part of the MOFI and use a Sector Committee to guide the overall development of the Strategy and an Implementation Support Unit for the execution of

[1] A draft version was presented to the scooping workshop. The present document was fully developed during 2000 based on the recommendations of the scooping workshop.

[2] The term "aquaculture" in this document refers to the culture of aquatic organisms and the management of aquatic resources.

[3] At all levels within and outside the sector.

the Strategy. The SAPA Strategy forms part of the Government umbrella "Hunger Eradication and Poverty Reduction" strategy.

Background

In Vietnam, the resolutions of the Party Congresses VII, VIII, IX and the Decree of the Party Central Committee defined that: in parallel with economic development and growth, Vietnam must concentrate on Hunger Eradication and Poverty Reduction. The resulting Hunger Eradication and Poverty Reduction (HEPR) strategy under the Ministry of Labour, Invalids and Social Affairs (MOLISA) has been recognised in Vietnam and internationally as a successful framework for poverty reduction. Over the last 10 years many policies, institutional changes, programmes and projects have been put into place to promote agriculture and rural development, build up irrigation systems, strengthen credit policy, support the marketing of products, this all to increase the living standards especially of the poor.

The intention for 2001-2010 is to expand the poverty alleviation content of HEPR, to eradicate hunger and enact policies that encourage communication of appropriate technologies, strengthen and diversify capital assets and reduce the vulnerability of the poor. Inter-ministerial co-operation is coordinated by MOLISA with each line ministry responsible for formulation of policy, the mechanism by which this is implemented and to provide implementation guidance at the local level.

The Ministry of Fisheries (MOFI) played a limited role in the first decade of the HEPR strategy. Its focus was more on industrial and commercial scale development, especially of aquaculture. However, following lengthy discussion among Government officials of MOFI and other concerned agencies and with the effective support from Ministry of Planning and Investment (MPI) and NORAD in March 2000, MOFI hosted a Scoping Meeting on "Sustainable Aquaculture[1] for Poverty Alleviation" (SAPA), in Hanoi from the 23rd-25th May 2000. The meeting was attended by 100 representatives from MOFI, MPI, MOLISA, Ministry of Agriculture and Rural Development (MARD), as well as provincial government agencies, people's organisations, international organisations and donors including NORAD, DFID, FAO and NACA who played a key role in planning and facilitating the meeting as well as AIT, DANIDA, ACIAR and UNDP, WB, ADB and many representatives from the Embassies. The meeting aimed to review the role of aquaculture development (in freshwater, brackish and marine environments) in poverty alleviation and hunger eradication in Vietnam, to review the information available on the livelihood status of the poor people in Vietnam, especially in aquaculture and fisheries, to identify strategies for more effective application of aquaculture in poverty alleviation, to initiate cooperation and dialogue among all parties involved in aquaculture with common interest in poverty alleviation and to prepare an action plan to follow on from the meeting.

The meeting identified several key issues, including: the need to build a poverty-oriented approach to policy involving better understanding of livelihood goals of poor people as a basis for identifying aquaculture interventions: the poor technical knowledge-base amongst practitioners, weak capacity among institutions at all levels, poor infrastructure and the importance of cooperation among agencies involved in implementing and supporting poverty alleviation through aquaculture (SAPA Scoping Meeting Proceedings – MOFI, 2001[2]). An action plan was proposed to analyse existing information on poverty and aquatic resources in

[1] The term "aquaculture" in this document refers to the culture of aquatic organisms and the management of aquatic resources.

[2] MOFI (2001) Proceedings of the Scoping Meeting on Sustainable Aquaculture for Poverty Alleviation, 23rd-25th May 2000, Hanoi, Vietnam.

Vietnam, to identify key areas where significant numbers of poor people benefit or could benefit from improved aquatic resource management and to better understand their livelihoods to inform the development of the SAPA Strategy; and to prepare a Strategy paper for submission to the Prime Ministers office prior to budget planning for poverty alleviation by MOLISA.

As recommended by the meeting, MOFI established an 8-person Task Force, under the overall direction of the Vice-Minister to assist the MOFI in preparing the SAPA Strategy document, comprising representatives from MOFI, Research Institute for Aquaculture No.1 (RIA-1), the University of Fisheries, the University of Can Tho, NORAD, DFID, NACA and AIT Outreach. A Task Force Resource Group comprising 12 members from different agencies and organisations supported the Task Force (including MOFI, MOLISA, MARD, RIA-1, 2 and 3, DANIDA, FAO, NORAD, ACIAR). The work of the Task Force was also informed by a DFID funded aquatic resource and poverty assessment implemented between June and September 2000, and an FAO supported construction of a database on donor funded projects in the Vietnamese fisheries sector and a reference list of information on aquaculture and poverty alleviation.

In September 2000, a finalisation workshop was convened by MOFI to review the progress of the Task Force group and to begin to finalise the strategy. This 'Sustainable Aquaculture for Poverty Alleviation' (SAPA) Strategy document is based on the discussions and recommendations from that workshop. The document provides a rationale for a fisheries policy focus on poverty alleviation, a description of the participatory process, principles to be followed for implementation and an implementation programme for the SAPA Strategy. Institutional arrangements and potential partnerships including between different projects/donors as well as requirements for MOFI to co-operate closely with MOLISA, Women's Union (WU) and MARD are also included.

The document is divided into two parts:

- **Part 1: The SAPA Strategy**, which provides the sector strategy for aquaculture that is now integrated into the Governments' HEPR strategy for implementation from 2001 onwards.
- **Part 2: Implementation of the SAPA Strategy**, which is concerned to support MOFI to implement the Strategy. It includes more information on the process; the organisation and actions required over a five-year period from 2001, in line with the HEPR strategy timeframe.

Part 1: The SAPA Strategy

Background synthesis and analysis of present situation

Global and regional context

The Sustainable Aquaculture for Poverty Alleviation (SAPA) Strategy addresses an issue of global and regional significance, as well as of national importance to Vietnam - poverty alleviation and improvement of the livelihoods of people living in rural areas and the fundamental role of aquatic resources management in sustaining poor people's livelihoods. Fish and other aquatic resources constitute a major source of animal protein and essential dietary micro-nutrients and an important source of income and employment. Experience gained during the last decade in Vietnam shows that development of aquaculture can make a significant contribution to better livelihoods and alleviate poverty, both as specific interventions and as a component of integrated rural development.

The significance of aquaculture to rural development was emphasised by the NACA/FAO "Conference on Aquaculture in the Third Millennium". The resulting Bangkok Declaration and Strategy on Aquaculture Development Beyond 2000 recognised that:

- "The practice of aquaculture should be pursued as an integral component of development, contributing towards sustainable livelihoods for poor sectors of the community, promoting human development and enhancing social well-being, and
- "Aquaculture can be an entry point for improving livelihoods, planning natural resource use and contributing to environmental enhancement."

The Conference on Aquaculture in the Third Millennium emphasised that: to increase the contribution of aquaculture to rural development and poverty alleviation, strategies are required to put people as the focal point for planning and development and to integrate aquaculture into overall rural development programmes. This reflects the strategic direction of current Asia regional initiatives, such as the STREAM[1] initiative, AIT Outreach and others.

Vietnam has gained successful experiences in using aquaculture for poverty alleviation. The SAPA Strategy seeks to increase the positive impact of aquaculture on poverty alleviation within the framework of rural development in Vietnam, taking into account the opportunities to link and learn from global and regional initiatives and strategies that may be applicable to the country.

The country development context

Vietnam has made remarkable progress in economic growth and development since the beginning of economic reforms in the early 1980s. Since 1988, aggregate GDP has increased on an annual basis by an impressive 8-10% in real terms (Poverty Working Group 2000) putting Vietnam among the 10 fastest growing economies. Industrial sector growth has been rapid (13% per annum), whilst the well-established agriculture sector, has grown at an annual rate of 4.5% during 1992-1998. This is largely a consequence of the assignment of land use rights to farm households and the liberalisation of marketing arrangements. Vietnam is now

[1] STREAM (Support To REgional Aquatic resources Management) is an Asia regional initiative that seeks to build capacity to understand the livelihoods of poor people dependent upon aquatic resources, link stakeholders to accelerate communications and learning, and facilitate policy making that reflects the interests of the poor. STREAM founding partners include NACA, DFID, FAO and VSO.

the world's second largest exporter of rice after Thailand, achieving an export volume of 3.8 million tonnes in 1998.

The performance of the agricultural sector has led to a dramatic improvement in the incomes of rural households, which have risen by 61% over the five years between 1993-1998, increasing the share of agriculture in rural incomes to 47%. However, there is concern that the limit to increase rice production based on further expansion of the area under cultivation has been reached. Apart from the Central Highlands, most land suitable for agriculture is already cultivated and new settlers have to do with less fertile land. These concerns, taken together with the vulnerability of the world market for rice, reinforce the need for appropriate forms of agricultural diversification. A breakdown of the contribution of different categories of agricultural activities demonstrates that 'there has been a tremendous diversification away from rice'. Though real revenues from rice cultivation have increased by 21% over this period, there have been increases of 53% in real revenues from livestock and aquaculture, 55% from other food crops, 66% from industrial annual crops (sugar cane, cotton, soybeans) and 127% from perennial crops (rubber, coffee, tea).

Wild and cultured fish contributes about 40% of the total animal protein intake of the population. The per capita availability of fish has increased from 11.8 kg in 1993 to 13.5 kg in 1995 and is expected to reach a level of 15.0 kg by year 2000. During the last few years (1994-1997) the contribution of the fisheries sector (including aquaculture) to national GDP was about 3%. The sector has performed well attaining a rapid growth in production from 890,590 tonnes in 1990 to 1,969,100 tonnes in 2000[1]. Whilst the potential for capture fisheries is estimated to be limited (up to 1.5 million tonnes per year), the contribution of aquaculture to total production continues to increase, reaching 727,140 tonnes in the year 2000. According to recent statistics, more than 3.4 million of people are engaged in the fisheries sector. Among these about 600,000 are involved in the aquaculture sub-sector. Although aquaculture production has increased dramatically in Vietnam, there is some indication that more intensive aquaculture systems such as coastal shrimp farming have caused inequity[2]. The Government has identified about 1.8 million ha of water surface suitable for aquaculture; however, in fresh water fisheries as well as in coastal areas aquatic resources are under threat from environmental degradation, over exploitation and poor management practices[3].

It is in the context of access by the poor, agricultural diversification and the threat of environmental degradation that the focus on increasing effective and sustainable use of the aquatic resources becomes particularly relevant.

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[1] MOFI (2000) Report on the fisheries development status and activities relating to the CPG since the 2nd CPG meeting. Ministry of Fisheries, Hanoi, Vietnam, pp. 6

[2] DFID (2000) Poverty and Aquatic Resources in Vietnam: an assessment of the role and potential of aquatic resource management in poor people's livelihoods, DFID, Bangkok, Thailand, pp. 36.
OXFAM (1999) Tra Vinh: a participatory poverty assessment. OXFAM-GB in partnership with Tra Vinh province, the World Bank and DFID. Hanoi, Vietnam, pp. 60

[3] DFID (2000) and MPI/UNDP (1999) Looking ahead: a common country assessment. UNDP, Hanoi, Vietnam, pp. 124

Poverty situation

Aggregate situation and recent trends

Economic growth and especially the performance of the agricultural sector have had a major impact upon levels of poverty in Vietnam over the past decade. This has been measured by the Vietnam Living Standards Surveys carried out in 1993 and 1998. The surveys included thousands of representative households and topics including expenditures and incomes; education; health; fertility and mortality; migration; housing; agricultural activities; small businesses and credit and savings.

The survey in 1993 showed that the population under the 'overall poverty line' (annual per capita expenditure of VND 1,160,000) was as high as 58%, while as many as 25% were below the so-called 'food poverty line' of VND 750,000. Other key social indicators such as child malnutrition – the incidence of stunting of children under the age of 5 – showed that 51% of children were malnourished. Enrolment at lower secondary school level had fallen to 29% of eligible female children and 31% of male children by 1993 following economic restructuring during the late 1980s. The percentages of rural population with access to clean water and electricity were as low as 17% and 48%, respectively and only 25% of households owned a television set.

By 1998, the situation had improved dramatically. A significant but much decreased 37% of the population were then classified as poor in relation to the adjusted overall poverty line (VND 1,790,000 or US$ 128) and just 15% below the food poverty line (VND 1,287,000 or US$ 92). The incidence of child malnutrition had fallen to 34% and lower secondary school enrolment had rebounded to around 61%. 29% of rural households now had clean drinking water and 77% electricity, and in material terms 58% of households owned a television set. Participatory Poverty Assessments carried out in four representative provinces, Lao Cai, Ha Tinh, Tra Vinh and Ho Chi Minh City, indicated that rural people themselves felt that their living standards have improved.

The Poverty Working Group analysis, from which these statistics are derived, noted a caution, as the trends are highly sensitive to the exact positioning of the poverty line, since much of the population lives very close to the threshold figures. Thus the dramatic gains in poverty reduction in Vietnam remain quite fragile and a relatively small deterioration in living standards caused by natural disasters, environmental degradation or external economic factors may push a substantial proportion of rural households below the poverty line again. Such problems have already been encountered as a result of recent natural disasters from flooding in central Vietnam and the Mekong Delta region during 2000.

Location and characteristics of poor people

80% of the total population and 90% of the poor people live in the rural areas in Vietnam. Among the regions, poverty incidence is higher and deeper in the Northern Mountain and Central Highlands, where 59% and 52% remained in poverty in 1998, and where the poverty gap index (measuring the depth of poverty, through the average shortfall of expenditure) was 16.8 and 19.1 respectively. In coastal areas, 48% of the population along the North Central Coast remain below the poverty line, but the depth of poverty was rather lower with an index of 11.8. These macro-regional figures, while providing an overall picture of poverty, hide considerable concentrations of poor people. For example, in the Mekong River Delta, although the poverty incidence 37% is relatively low the area still holds 21% of the total number of people living in poverty in Vietnam. Whilst the Mekong Delta has one of the

lowest percent of households classified as hungry it has the second highest number of very poor households categorised as "starving" and is ranked by the General Statistics Office as 3rd poorest.

Table 1: Indicative figures reflecting poverty situation of typical geographical regions

Indicative figures	N. Mountain	N. Central	Mekong Delta
Per capita of rice (kg/month)	14.38	13.41	13.37
Per capita of fish (kg/month)	0.4	1.11	2.44
Per capita of meat(kg/month)	0.97	0.71	0.98
Income (VND)	173,760	174,050	242,310
Living expenditures (VND)	149,800	137,920	194,290
Malnutrition rate (%)	41.25	41.58	42.19

Poverty relates to people not regions. Poor people tend to have lower levels of education and are often physically isolated. Although in Vietnam, only 4% of individuals live in villages more than 5 km from a road, or live on roads, which are impossible to access for three or more months of the year, much more villages do not have motorised transport services. Again the incidence is highest (37.5%) amongst households in the lowest expenditure quintile. This isolation is related to and compounded by ethnicity. Although the figure has declined since 1993, still 75% of ethnic minority groups are living below the poverty line. Poor people tend to be excluded from, or less able to access, development initiatives, e.g. credit programmes and are often excluded from the decision making process. Poor people are more vulnerable to health crises, natural disasters and degradation of natural resources. As might be expected, 79% of the poor households in Vietnam are working in the agriculture sector. Most of these households have small land holdings and an increasing number (21% in the Mekong River Delta) are landless (this also includes water surface and swidden). Such lack of assets makes them more vulnerable during the hunger months. Near-shore fisher-families are recognised as poor due to the declining catch and the frequent risk to their livelihoods of natural calamities, such as typhoons.

Women and children, landless, invalids, migrants, and the unemployed are most vulnerable to poverty. Poor and hungry households are often those with few labourers and relatively many children, often headed by women who lack alternative employment and traditionally bare responsibility for child rearing and the household. The average number of children is highest among households in the lowest expenditure quintile. Women have less access to social services and technical support through traditional extension services, and especially in lower expenditure quintiles many women are illiterate, especially in remote and mountain regions.

The causes of poverty are diverse depending on geographical locations. For example, the Northern Mountain population is suffering poverty as a result of geographical isolation, limitations in land area for rice cultivation, poor communications and transportation infrastructure, poor public and extension services, including health and education, difficult access to market and credit services. The supporting policies and assistance from the Government also have difficulties to reach to grassroots levels in these areas. The people in Northern Central coastal areas have very little arable land, and aquatic resources that are an important part of people's livelihoods in this area are overexploited. Moreover, a harsh climate with high risk of natural calamities such as typhoons and flooding makes the livelihoods of people in this area particularly vulnerable.

Government policy and institutional framework for poverty alleviation

Government policy

As the development gap between urban and rural areas has increased during the transition towards a market economy, rural development has been given first priority in the Government's current development strategy.

MOLISA began co-ordinating the "Hunger Eradication and Poverty Reduction (HEPR)" programme in 1992 as part of a large focused effort to mobilise available resources by all Government sectors and the Vietnamese people through formulating and implementing realistic programmes to support the rural poor. One of the more remarkable interventions under HEPR is targeting the "communes faced with extreme difficulties" (CED's) with the "Programme for Socio-economic Development in CED's" and the "1715 Remote and Mountainous Communes Programme". This programme has an innovative concept transferring resources from the Government directly to the communes. During the first year, based on consultative exercises carried out by the Commune People's Committees, investments in six types of rural infrastructure were allowed (roads, irrigation, electricity, schools, clinics and domestic water supply). In short, the districts hold the funds, and a Project Management Unit, consisting of users and representatives of the various organisations at the commune level, monitors each approved project. The basic principle is to make local people responsible for their own development, and it is an element in the promotion of local and decentralised democracy. During the first year of implementation in 1999, the project absorbed 2/3 of budget allocated to the HEPR programme and thus became the flagship. Moreover the project was placed under the management of MPI, indicating the importance given by the Government. Although HEPR programmes have had success in addressing some of the main underlying causes of rural poverty, failure to address broad policy issues on health, education and rural infrastructure have been identified as well as lack of participation in project identification, design, planning and implementation[1]. A recent report for the agriculture sector[2] (for MARD) recommends that one of the main development tasks at the provincial and district levels should be to develop an approach enabling rural people and their organisations to prepare 'bottom-up' plans and activities; with training in participatory techniques, economic, social and environmental analyses and use of these techniques to work with local people in selection of projects and development activities. It recommends that pilot provinces should be selected to apply these techniques, which are likely to result in some reallocation of resources and governance from central to provincial, district and commune levels.

Most recently a Comprehensive Poverty Reduction Strategy (HEPR) has been prepared which the Government will approve around mid-2001. MOLISA will be the secretariat co-ordinating the established National Multi-ministerial coordination committee. The goal is to put poverty reduction at the centre of most policies and programmes in Vietnam, as recently affirmed by President Tran Duc Luong at the United Nations Millennium Summit[3] in New York. To implement this strategy different sector ministries, mass organizations and NGOs have been requested to prepare specific sector policies of which the following can be listed: i) credit access for the rural population and poor sector; ii) public health care/assistance; iii) supports for education/training for the poor; iv) material support for extremely poor groups; v) legal and educational services; vi) material support for vulnerable and disadvantage

[1] UNDP/UNICEF (1996) Catching up: capacity development for poverty elimination in Vietnam. UN, Hanoi, pp.132

[2] Lincoln International (1998) Poverty alleviation in Vietnam

[3] 6th-8th September 2000, New York

groups; vii) support in housing for the poor and homeless; and viii) providing land and water surface for the landless.

The Government has listed 7 project groups namely: 1) infrastructure improvement for the poor areas; 2) processing, technology, extension (agriculture/forestry/aquaculture); 3) resettlement of the disadvantage groups; 4) culture and information improvement; 5) capacity building of all level; 6) alleviation of "monkey bridges" in Mekong River Delta; and 7) building sustainable poverty alleviation models.

Fishery and aquaculture sector

Although the coastal and inland fisheries sector involves many of the poorest and most vulnerable groups, and many donor-co-financed interventions within this sector have had an overall poverty alleviation development objective, MOFI has played so far only a minor role in the HEPR strategy or other national efforts towards poverty reduction. The exception is Programme 773, and some research and development projects supporting rural households. Since 1994 the Government has promoted Programme 773, which aims to support rural people in using potential area (flooding fields, swamps, tidal flats) for aquaculture. To date, the programme has approved 100 countrywide projects allocating a total of VND 1,130 billion for infrastructure construction and reclamation of "under-used" water surface for aquaculture. Research institutes under MOFI, especially RIA-1 have been involved in a number of research and development projects[1] attempting to disseminate small-scale aquaculture technology to farmers. Table 2 shows recent relevant initiatives.

Table 2: Recent fisheries sector/donor initiatives

Date	Donor	Objective
From 1986-1997	UNDP/FAO	Strengthen research capacity, develop an extension network for the promotion of low-cost aquaculture to small-scale farmers
From 1995	AIT, funded by SIDA	Extend on-farm research to integrated agriculture-aquaculture systems in Red River Delta
From 1997	AIT, funded by SIDA	Support a dialogue with the Northern Mountain provinces to introduce the potentials of such technologies for poverty alleviation
From 1999	UNDP/FAO	Follow a more participatory approach in three Northwest Highland provinces
From 2000	AIT, funded by SIDA	Following UNDP approach
From 1998	NORAD	Capacity building support for rural/coastal area poverty alleviation
From 2000	DANIDA	Provide broad support to the fisheries sector, with poverty alleviation as one core objective
From 2000	NACA, DFID, FAO	STREAM initiative. Aquaculture and aquatic resources management for poverty alleviation, regional networking.
	ACIAR, IDRC, other donors	Small-scale research projects on small scale aquaculture

Justification for poverty alleviation through aquaculture

Aquatic resources and the livelihoods of poor people

Full-time fishers are often amongst the poorest, and fishing is a supplementary/seasonal activity for many poor and vulnerable groups. Aquatic resources, including non-fish resources, often provide poor people with an important source of nutrients, which are not easily substituted (particularly in times of hardship) and an important economic activity, if

[1] The SAPA Scoping Meeting report (MOFI, 2001) provides a more complete listing of donor poverty related aquaculture and aquatic resource management projects.

only seasonally. There is evidence that poor people in mountain areas are able to maintain kinship connections, by using small-scale aquaculture ponds as a means of receiving guests for funerals and weddings, which otherwise would represent significant shocks to their livelihoods. There is also evidence that landless and land-short people depend heavily on swamp and mangrove fisheries, often capturing small non-fish aquatic resources. There is evidence that community management of water bodies, and dry season refuges or other forms of rehabilitation of fishery habitats and enhancement can improve poor people's livelihoods. The capacity of poor people to engage in aquaculture depends upon their asset base including human assets (e.g. labour, education, skills), natural assets (e.g. land, water, wild fish, forest), social assets (e.g. kinship, connections, status), physical assets (e.g. roads, tools, equipment) and financial assets (e.g. credit, savings, income, insurance). The outcomes that people chose and their capacity to convert their assets into those outcomes is influenced by the wider social arena in which people live, and the policies, institutions and processes (mediated through markets, communities, governments and households) which affect their lives. Therefore interventions, which aim to support poor people to manage their aquatic resources, need to be identified based on an understanding of poor people's livelihoods (DFID, 2000[1]).

Poverty alleviation through aquaculture

Commonly 80% of the households in coastal communities get their income from fishing, whilst almost all livelihoods rely on fish capture and associated activities, as coastal communes commonly have little agricultural land. Poor coastal fishers livelihoods are vulnerable to seasonal weather, destructive typhoons and migration, for 3-4 months annually fishers rely on savings or credit to buy food. Recently natural capital has declined (due to over fishing, introduction of other gears fishing the same stock, destruction of mangroves, construction of large shrimp ponds). Negative impacts of high-risk (shrimp) aquaculture has contributed to landlessness of some poor people, e.g. in Tra vinh, due to indebtedness provoked by failed harvests due to shrimp disease. Such risks can be recognised and reduced through adoption of low-risk aquaculture techniques (simple fish culture, mollusc farming), and by providing appropriate extension and resource management, which support the needs of poor people. Social capital in the form of fishing co-operatives promotes collective action, provides safety nets, etc. though their resources are linked to the productivity of the fish resource. People's organisations provide connections, information and access to extension, assets and asset building opportunities.

In coastal areas like Nghe an, Nam dinh, Nha trang, Quang binh and Hai phong (Do son), aquaculture interventions have offered entry points for improving people's livelihoods and reduced the vulnerability of low-income families and land-less fishermen, forced in large numbers to leave inshore fisheries due to declining stocks and habitat destruction. In Nghe an and Nam dinh hard clam farming in shallow inshore waters has provided a low-cost alternative to poor, land-less fisher families. With effective management of aquatic resources, there is an opportunity to improve livelihoods of coastal people, as in the case of using bivalve resources in Ba tri district, Ben tre province. In Nha trang land-less fishing families have been shown to benefit from involvement in small-scale sea farming of fish and lobsters in cages. There are proposals now to integrate small-scale marine aquaculture as an alternative livelihood option within a Biodiversity and Marine Protected Area Management Project in this coastal region. Incomes from agriculture on less fertile land in coastal areas are extremely low. Experiences in the Central Coastal provinces (e.g. Thua Thien- Hue)

[1] DFID 2000. Aquatic Resources Management for sustainable livelihoods of poor people: Proceedings of the DFID-SE Asia Aquatic resources management programme E-mail conference, June 2000, DFID, Bangkok, Thailand, pp. 148

demonstrate the potential of fish/shrimp/crab culture in areas where agriculture is less suitable.

The Mekong Delta comprises a range of agro-ecosystems some of which are fragile. Over the last 20 years the Government and farmers have transformed the 4 million ha Delta and their farming systems through canal excavation, settlement and reclamation of land and intensification of rice farming. 70% of mangroves and 95% of malaleuca forests have been destroyed. Poor Delta dwellers are especially vulnerable to seasonal flooding, in Long an, Tien giang, Dong thap and An giang the flood is regularly 0.3-3m, during flooding rice farmers rely on fishing. In the dry season the river flow can reduce by 95% and saline intrusion occurs, the farmers will use saline paddies for aquaculture purpose.

The wild fishery has declined due to over-fishing and habitat loss, the use of pesticides and in early rainy season low pH in canals from acid sulphate soils. Many poor people who depend on aquatic resources have lost out. However, improvements in management and farming systems of mixed shrimp-mangrove farms in the Mekong Delta have led to improvements in livelihoods, providing an alternative for poor people to cutting of mangrove forests.

Frequent flooding in the Delta makes it necessary for farmers to elevate land for housing and crops, giving rise to physical assets such as ponds, canals and rice fields. Limited aquaculture is now practised by 60-70% of households. In rain-fed areas of Long an and Binh phuoc province where water quality is difficult to manage ponds operated by poor people commonly grow catfish, tilapia and kissing gourami. In the irrigated areas of for instance Tay ninh province some year round access to sub-canal water has provided opportunities to develop specialised aquaculture systems (to grow tilapia, *Pangasius*, common carp and kissing gourami).

In the mountain regions where wild fish stocks have declined but water is stored in reservoirs, poor people stocking fish are reducing their vulnerability to crises and improving their food or financial security. For example, fish in ponds of ethnic people in the Northern Highland areas, are being used as a 'food/income bank' for times of crisis, seasonal food shortages or even social events.

Poverty assessments in Vietnam emphasise the importance of interventions, which increase and diversify agricultural incomes and reduce vulnerability, and aquaculture appears to be one of the most effective options available in upland, Delta and coastal areas.

Government support for aquaculture

The Government has taken a number of decision and measures to support aquaculture development as it increasingly recognises the contribution of aquaculture to poverty alleviation and rural development.

In the annual review of the fishery sector in 1998, the Prime Minister emphasised the important role of aquaculture for sustaining fish production. He considered aquaculture as an underdeveloped sub-sector with significant potential for alleviation of poverty. This high-level support resulted in Government approval of a development plan for aquaculture for 2000-2010 prepared by MOFI in late 1999. The objective of the development plan is to ensure food security for Vietnamese people and production of export commodities including raw materials for export targeting processing. The programme expects aquaculture to contribute 60-65% of total production of aquatic products by the year 2010.

On 15 June 2000 Government again made a policy statement in decision No 09 about measures to economical restructure the trade of agro-commodities in which it was clearly instructed that sustainable aquaculture should be developed, by converting flood plains and coastal land for aquaculture. Diversification of crustacean species in different intensification systems and polyculture with various fish species was promoted as appropriate approaches for aquaculture. The measures included decisions on land lease and specific priority to credit access for poor and farmers in remote areas.

Still this support and the different ongoing programmes and project activities have not been brought together in a way, which addresses the livelihood objectives of the poor. Until the initiation of the discussions on the SAPA Strategy, the aquaculture sector was not included in the sectoral programmes proposed during the planning of the Government's Comprehensive Programme " Hunger Eradication Poverty Reduction ".

Appropriate systems for poverty alleviation

Livelihoods of poor people could be improved through a stepwise and flexible process, building basic husbandry and management skills through a participatory and adaptive approach (DFID, 2000). The building of institutional capacity and incentive structures of responsible local support agencies should be similarly incremental, e.g. incentive mechanisms whereby operational budgets could be increased in line with the work done. Promoting networking amongst sectors of fishers, small-scale producers, processors, etc. was also identified as a key issue to support local, national and regional learning.

Vietnamese aquaculture, in contrast to many countries, is mainly performed as family-scale operations. In freshwater aquaculture the most popular farming systems are integrated gardening-fish pond-livestock pen system (VAC), rice-fish culture and fish culture in very small reservoirs through polyculture practices. The systems are characterised by low-input use and requirements, including land resources with rather low productivity, but environmentally benign and providing a relative high economic efficiency. For example, while environmental neutral integrated farming systems commonly use 10-30% of available land area, they generate from 30 to more than 70% of on-farm income. Another example from rice-fish culture systems shows that when fish is stocked in rice fields, the use pesticides can be reduced by 70-100% without influencing rice productivity. The farmers at demonstration farms gained an extra 3-5% in rice production and another 230-300 kg of fish without additional inputs. As a result, the system provides a net profit 1.5 times higher than single rice cultivation, and with reduced risks from pesticides. This indicates that appropriate farming systems can contribute to social, economic and environmental improvements.

In coastal aquaculture improved systems have been introduced with rotation cropping of different species such as crabs, fish, shrimps, bivalves and seaweed in small ponds, but this still needs more attention. Within marine aquaculture so far no focus has been given to the development of appropriate systems and much of the resource potential still rests un-exploited. With regard to planning of marine aquaculture this is just being started up in selected areas through national initiatives, with support from NORAD and the SUMA component of the DANIDA Fisheries SPS.

The improved systems will generate income and employment, enhance food security and nutritional value of diet, and stabilise livelihoods of communities through direct involvement in aquaculture production, as well as those who provide services to aquaculture.

Challenges in developing pro-poor strategies

Whilst having considerable potential, there are several key challenges that need to be addressed for developing pro-poor strategies for aquaculture to be of sustained benefit:

- *Planning in an integrated rural development framework focussed on poverty reduction and reflecting the local resource base and priorities.* Learning lessons, e.g. not developing aquaculture in lagoons in ways that cause displacement of poor and vulnerable boat families, whilst benefiting the better-off; not supporting shrimp farming in poor coastal provinces in ways that limit access by the poorest people to credit and land, and exclusion from extension services due to language difficulties e.g. among Khmer people[1].
- *Capacity building amongst service providers to identify and support poor people's livelihood objectives.* There is a need for analyses of the diversity and dynamics of livelihoods, and the role of aquaculture to support formulation of policy and interventions that build on the objectives and strengths of poor people and allow their participation in planning, implementation, monitoring and evaluation of the initiatives.
- *Awareness raising and better communication of experiences of the role of aquaculture as a potential entry point for improving poor people's livelihoods.* There is a need for linking with the Asia regional initiative "Support to Regional Aquatic Resources Management" (STREAM) programme. More exposure of successful case studies in Vietnam should be communicated amongst stakeholders, particularly decision-makers in different sectoral departments and ministries, and donors to strengthen support within rural development initiatives.
- *Networking amongst large numbers of widely scattered poor people who manage aquatic resources.* It is imperative to take into account the differences in skills, knowledge and education, and focusing on equity and participation during the process of establishing networks. Other stakeholders including service and equipment suppliers, processors and/or marketing intermediaries and agencies involved in supporting foundation services such as credit, extension and research, training and education from Government and non-government agencies and donor agencies should also be considered.
- *Improving access for poor people to materials, financial services (credit, insurance, savings), information and markets.*
- *Developing environmentally friendly technologies for brackishwater and marine aquaculture.* Since there is limited tradition in coastal aquaculture, appropriate technologies and planning of development is limited. This could lead to environmental degradation (e.g. impacts of nutrients and disease causing agents; the strong dependency on wild captured fry) and low production. In inland areas, technologies and farming systems exist, with the possible exception of some indigenous fish species, and emphasis should be more on extension of existing technologies to poor people.
- *Limiting degradation or unsustainable exploitation of the natural resource base,* including habitats, biodiversity and fish resources in coastal and inland areas through proper planning for aquaculture (and other) activities as part of the broader resource management and rural development initiatives of which aquatic resource management is a component.
- *Improving co-ordination of (donor) support,* both among Government agencies and donors.

[1] OXFAM, 1999. Tra Vinh: a participatory poverty assessment. OXFAM-GB in partnership with Tra Vinh province, the World Bank and DFID. Hanoi, Vietnam, pp. 60

SAPA: The "Sustainable Aquaculture for Poverty Alleviation" Strategy

SAPA Goal, Purpose and Outputs

The Vietnam Development Report 2000 "Attacking Poverty" emphasises that each sector should design a programme, which contributes to poverty alleviation, through contributing to three key pillars of poverty alleviation: (1) creating opportunity; (2) ensuring equity; and (3) reducing vulnerability.

The SAPA Strategy is formulated by MOFI to contribute to the goal of poverty alleviation as part of the overall Government "Hunger Eradication and Poverty Alleviation" strategy. The purpose of the SAPA Strategy is to enhance the livelihoods of poor and vulnerable people through aquaculture with the following outputs:

(1) Capacity of institutions strengthened, particularly local institutions and communities, to understand and support the livelihood objectives of poor and vulnerable people, who depend on or who could benefit from aquaculture;
(2) Access improved for poor people, to materials, information, financial and extension services and markets; and
(3) Communication improved amongst stakeholders[1], through awareness raising and knowledge sharing, networking, inter-sectoral/sectoral and donor co-ordination, introduction of participatory planning, implementation, monitoring and evaluation approaches and informing policy development;
(4) Environmentally friendly, low-risk, low-cost aquaculture technologies and management practices developed and adopted.

SAPA Approach

The SAPA strategy recognises that a step-wise approach is needed, to gradually build knowledge and activities based on analyses of livelihoods and local pilots. It makes the aquaculture sector part of the Government umbrella "Hunger Eradication and Poverty Reduction" (HEPR) strategy co-ordinated by MOLISA. The following indicative activities will support the achievement of the above outputs.

Building capacity for poverty alleviation

The SAPA strategy emphasises the need for strengthening of capacity among institutions, particularly local institutions, to understand and support livelihood objectives of people in inland and coastal communities, who depend on or who could benefit from aquaculture. The capacity of local institutions to understand poor people's needs and participatory skills are the basis for guiding interventions that support and are based on poor people's needs. The capacity for livelihood analyses will therefore be given a high priority during the early stages of implementation of SAPA.

At the beginning of the implementation period, local institutions will be identified, and their training needs for livelihood analyses clarified. SAPA will support capacity building based on these need for the staff of these institutions so that they can take responsibility to implement SAPA activities. Capacity building will progress through workshops, training and other relevant programmes and practical field work in selected pilot communes on livelihood analyses.

[1] At all levels within and outside the sector.

Improving access of poor people to services

The SAPA strategy recognises that better support for materials, information, financial and extension services and markets is required to serve the needs of poor people. The strategy will therefore seek to establish more effective mechanisms for poor people to access the inputs and services required.

Based on livelihood analyses, coalitions of partners that will be established for support in selected locations. Consultations and partnerships will be established with agencies, such as the Bank for the Poor, to explore and develop means to improve access to the financial and other services.

The SAPA strategy will support pilot projects to develop new ideas and approaches that improve access of poor people to services. Such pilots would describe and recommend ways to improve access to resources, innovative extension tools and methods, and better access to markets, credit and other services to support poor people, and experiences will be widely shared.

Improving communications and networking

The SAPA Strategy recognises the need for much more effective networking and communication on poverty alleviation and aquaculture at all levels. Communication will be improved amongst relevant stakeholders through awareness raising and knowledge sharing, networking, sectoral and inter-sectoral and donor co-ordination, introduction of participatory planning, implementation, monitoring and evaluation approaches.

SAPA will collate and share existing and new experiences and the lesson's learnt will be used to inform government policy development.

Initially, the SAPA document will be published and widely disseminated among concerned agencies and other stakeholders and the document will be adapted in and circulated among farmers. To promote effective communications among existing projects, an information system will be established, building on existing systems and resources in Vietnam. Links will also be promoted between Vietnam and regional initiatives.

Environmentally sound, low-cost, low-risk and easily copied systems, based on identified livelihood objectives of poor and markets will be identified and disseminated through appropriate channels and in response to local needs.

New ideas and approaches emerging from **pilot projects** will be communicated and widely shared.

The communication and coordination among donors will be encouraged through formal and informal meetings to promote effective cooperation in support of the government objectives for poverty alleviation.

Technology and management

The SAPA strategy supports the development of environmentally friendly, low-risk, low-cost aquaculture technologies and management practices relevant to poor people.

The technologies for small-scale freshwater aquaculture appropriate for poverty alleviation are now largely in place. Rather than technical research, the need now is for responsive

government institutions, effective targeting of poor people, and support to overcome the constraints to entry.

In coastal areas, where there are significant numbers of poor people, such environmentally friendly, low-risk, low-cost technologies are not readily available, and a major concern in Vietnam is to develop the technologies and management systems that are appropriate for poor people.

In support of the development of aquaculture techniques, better social and environmental impact assessment methodologies and aquatic animal health management strategies for small-scale farmers are required.

SAPA will support development of appropriate hatchery, nursery and grow-out technology and management practices, as required, through participatory research agendas. Capacity building and other support may be required to orient research institutes towards such new participatory driven agendas.

In open access resources in inland and coastal areas, SAPA will support the development and implementation of co-management approaches that help secure the livelihoods of poor people.

Target groups and areas

The ultimate target group of SAPA is poor people in rural areas where opportunities exist to diversify and improve livelihoods through aquaculture. Special attention will be given to the most vulnerable groups and thus the geographical focus will be on the Northern Mountains, Central Highlands, North Central Coastal provinces and the Mekong Delta. The initial activities of SAPA will then be towards identifying the poor and more vulnerable groups, as a basis for more targeted follow up activities within these selected geographical areas.

The immediate target of SAPA is the supporting institutional and policy framework, and SAPA will establish links with district, provincial, national and regional institutions, and donor/development agencies with responsibilities for poverty alleviation and sustainable rural development.

Integration with other poverty programmes

The SAPA Strategy is to work alongside other projects and programmes, raising the profile of the role of small-scale aquaculture amongst external and Government resource providers within the emerging operational framework for decentralised rural development (whether these follow a broad rural development strategy or concentrate on a particular development sector, be it agriculture, health or education). If this takes the form of the current "1715 Communes Project", then local government (communes) will be able to propose projects in small-scale aquaculture in much the same way as presently takes place in rural infrastructure projects. As such, the SAPA Strategy will help to widen the Government resources available for implementing this concept, as is already proposed in Decision No. 135. Aquaculture options for poverty alleviation should be emphasised within the development arena, through linking to rural development projects such as the World Bank pipe-line Project on Poverty Reduction for the Northern Mountains and the ADB project for poverty reduction for the Central Region. Already such a relationship is developing with the European Union funded Rural Development Project in Cao bang under the AIT-SIDA Project.

It is therefore intended to move forward through implementing a series of "pilots" (pilot projects) in which both the approach itself and technical and management options for aquaculture could be tested. In some cases, such projects already exist, and would form the basis for this experimentation. In other areas, it may be necessary to develop new pilot projects.

Responding to poor people

The accountability and responsiveness of the MOFI to poor people will be key to the success of SAPA. The development of mechanisms for broad participation and the delivery of services, involving poor people in planning (identifying strengths and objectives using in a livelihood approach), identifying and developing partnerships, implementation, monitoring and evaluation is necessary. SAPA will aim to forge ties within communities and facilitate local collective action, by initiating programmes that build assets of poor people or make services more readily available. These might include intensive dissemination of information, facilitating networks to make available to communes the support they need to implement programmes. Where the management of an aquatic resource involves or is affected by other stakeholders, especially in coastal areas, wider public involvement will be encouraged. It is recognised that human resource constraints preclude the development of a dedicated extension service for the aquaculture sector. Instead, links would be made with non-specialist agencies (Agricultural Extension Services), social organisations and mass media and unconventional means of extension explored. Materials developed with farmer participation, and based on the information derived from pilot projects and success stories, will be produced to assist these non-specialist groups in dissemination of information.

Awareness creation and capacity building among the institutions supporting the poor (e.g. local government/administrations, mass organisations, such as Departments of Fisheries (DoFI), Departments of Agriculture and Rural Development (DARD) and Departments of Science, Technology and Environment (DOSTE), and social organisations, such as the Farmers' Association, Women's Union and Youth Association) to better understand and facilitate their objectives, will be the key, to build capacity among poor people in support of their objectives. The emphasis will be on understanding the place of small-scale aquaculture in poor peoples livelihoods and the objectives and strengths of the poor. This will require creation of a training capacity, initially in pilot areas. It should be noted that some institutes, universities and projects have already developed some capacity in a participatory process, e.g. the UNDP/FAO "Aquaculture Development in Northern Uplands" project is proving to be a focus of communicating skills in participatory assessment.

Part 2: Implementation of the SAPA Strategy

SAPA will be implemented gradually. It begins with capacity building in livelihood analysis that will be used to better understand the livelihoods of poor people in selected social and environmental contexts. This understanding and participatory process will provide the basis for development of a detailed workplan and implementation of activities required to support poor people. The Strategy itself is dynamic and has the capacity to adapt to changes as required during the long-term process of implementation. The strategy targets twenty selected areas for the main activities during the first 5-year period from 2001 – 2005. This time frame is in line with the first phase of the HEPR strategy.

After 2005, a second 5-year phase is planned that would aim to expand and duplicate the experiences of the first five year to wider target audience throughout the country.

The activities and the implementation plan of the Strategy are given in this Section II – Implementation of the SAPA Strategy. The activities required are outlined in a logframe that will form the basis for development of detailed workplans for SAPA.

Institutional arrangements for implementation

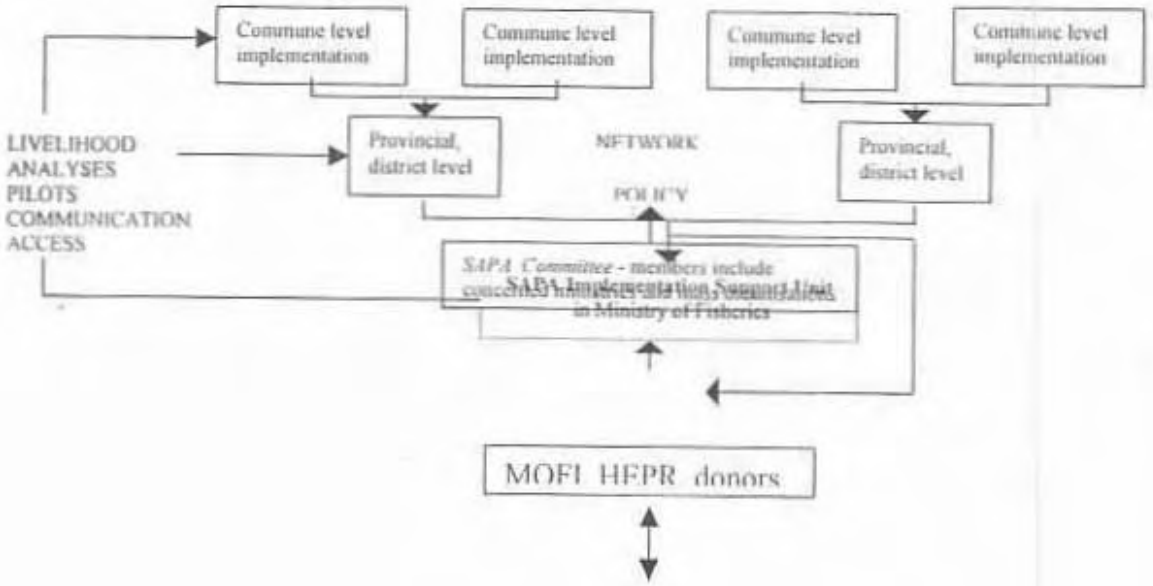
Further development and implementation of SAPA is the responsibility of a Committee, which will consist of members from concerned Ministries and mass organizations (e.g. MPI, MARD, MOLISA, MOET, MOFI, WU and Bank for Poor). Ministerial Leadership within MOFI will chair it. The SAPA Committee will regularly communicate with the HEPR Strategy, will approve annual workplans and reports, and will promote the Strategy within the state machinery. The Chair of the SAPA Committee (or a person designated by the Chair) will represent MOFI in the Government HEPR strategy committee.

An Implementation Support Unit (ISU) will be established within MOFI, will be responsible for the co-ordination of the day-to-day implementation of the Strategy, among the stakeholders (e.g. DOSTE, International Cooperation Department, Extension Centre, Department of Fishery Resource Management, RIA's, provincial DOFI's and DARD's, and other relevant organisations). The ISU will have one full-time administrator and several support staff.

The ISU will be the national focal point for linkage with other regional activities, such as the Asia regional "Support to Regional Aquatic Resources Management" (STREAM) initiative.

As an implementation mechanism, appropriate focal points at provincial, district and commune levels will be selected for communications and information exchanges, and the communications network will be gradually expanded during implementation of the SAPA Strategy. The focal points at commune level will implement the day-to-day activities, assisted by the provincial and national networks. The implementation of SAPA will be decentralised, with support as needed from the ISU (see Figure 1).

Figure 1: Institutional chart of SAPA Implementation Support Structure



SAPA Logical framework

	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
GOAL			
Contribute to alleviation of poverty	- SAPA Strategy recognised by government as sector poverty alleviation strategy as part of HEPR strategy -Production of small-scale aquaculture contribute 40% to total aquaculture production -60-70% of poor households benefited from aquaculture and related services -Aquaculture has contributed to a decrease of poor and food insecure households. -Aquaculture incorporated in multi-sectoral rural development interventions for poverty alleviation. - Sector policy based on lessons learned.	HEPR 'evaluation' reports CSO and MOFI figures National Institute of Nutrition figures Rural development project documents	
PURPOSE			
Enhance the livelihoods of poor and vulnerable people, who could benefit from aquaculture	- Average income of households engaged in integrated farming in target communes increased by 50-60% through aquaculture. - Average income of aquaculture households increased by 80% - Poverty alleviated among 95%-100% of poor households in selected communities through aquaculture and related activities	SAPA annual report Project reports EIA reports LHA reports	Natural disasters will not seriously affect the target communes. Market demand for aquaculture products continues to grow. Government policies continue to favour aquaculture sector development Financial contributions to for SAPA sufficient.
OUTPUTS 2001-2005			
1) Capacities of institutions strengthened, particularly local institutions and communities, to understand and support livelihood objectives of poor and vulnerable people, who depend on, or could benefit from, aquaculture.	- 10 core institutions with capacity to conduct training in livelihood analyses and participatory approaches to understand livelihoods of poor people; - livelihood analyses conducted and results communicated from 20 target areas; - 100 people trained in livelihood analyses and participatory approaches	Project reports LHA reports SAPA annual report; Formal training course agreements between core institutions and SAPA ISU SAPA evaluation reports of training courses	Persons available for training

OUTPUTS (2001-2005)	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
2) Access improved for poor people to materials, information, financial and extension services and markets.	- 60-70% poor and vulnerable households able to access of aquaculture inputs and services in target areas; - 40% increase in aquaculture productivity achieved in target communes due to better access of aquaculture inputs and services; - Pro-poor extension and financial services in place in selected target areas.	SAPA annual report. Project reports. Extension and financial reports in selected target areas.	
3) Communication improved amongst stakeholders, through: awareness raising and knowledge sharing, networking, inter-sector/sector and donor co-ordination, introduction of participatory planning, implementation, monitoring and evaluation approaches and informing policy development.	- SAPA Strategy published and disseminated to all provinces, key institutions and donors; - SAPA network of institutions and programmes/projects established and in operation; - Database and information system established; - 30 key institutions involved in SAPA have designated trained staff to work as focal points; - Lessons learned and experiences collated and disseminated on the SAPA network; - SAPA ISU is exchanging information with CPG/ICD, MOFI; - Participatory planning, implementation, monitoring and evaluation approaches incorporated in government policy.	SAPA strategy document in Vietnamese and English versions; Practical farmer manual of SAPA Formal agreements between institutions and SAPA ISU; Network information exchange reports/meeting minutes; Policy documents Programme documents from other sectors; Manual for participatory approaches in Vietnamese.	
4) Environmentally friendly, low-risk, low-cost aquaculture technologies and management practices developed and adopted.	- Appropriate systems identified, based on market potential and livelihood objectives of poor; - New appropriate coastal and marine hatchery, nursery and grow-out technologies and management practises developed through participatory research agendas; - Research agendas of institutions on poverty issues developed based on participatory approach - Socio-economic and environmental impact assessment of new technologies conducted; - Aquatic animal health management strategies for small-scale farmers disseminated.	Appraisal study reports; Project reports; Impact assessment reports; Practical AAHMS-guidelines for small-scale farmers.	

ACTIVITIES	APPROXIMATE TIMING	INDICATIVE INPUTS	ASSUMPTIONS
1.1. Identify institutions to be nominated/ requested as SAPA focal points; 1.2. Build participatory skills of staff at focal points for livelihood analysis of poor people dependant on aquaculture and aquatic resources. 1.3. Select pilot communes and households for livelihood analyses based on agreed poverty ranking. 1.4. Perform selected livelihood analyses; 1.5. Prepare and disseminate report of livelihood analyses.	Mid-2001 onwards	Staff from govt and local agencies Resource persons for training/support to livelihood analyses Training materials and facilities. Govt and donor funds	Necessary equipment, information and people available Funds available
2.1 Investigate demand, access, reach and potential of extension, financial, R&D, market and other services to support poor people. 2.2 Identify and initiate pilot activities in selected localities to test approaches that improve access of poor people to services (including coalitions of partners among service providers). 2.3 Monitoring and evaluation of pilot activities 2.4 Undertake activities that encourage widespread adoption of pro-poor services.	2002-onwards	Staff from govt and local agencies Support from ISU to identify and implement pilots. Resource persons Materials and facilities Govt and donor funds	Service providers willing to participate
3.1Publish and promote SAPA Strategy; 3.2 Prepare a communications plan for a national network of existing projects, central, local institutions and donors to support SAPA implementation. 3.3 Link the national network with others sectors in the HEPR programme and at regional level; 3.4 Hold a national workshop to introduce SAPA strategy and implementation programme to stakeholders 3.5 Regular meetings of participants, publications and other forums for information exchange. 3.6 Undertake activities to ensure lessons learned are informed to supporting agencies and services (credit, extension and research, training and education), government, NGO and donor agencies and contribute to policy development.	Mid-2001 Sept-Oct 2001 National workshop in November 2001 Implementation from 2002-onwards	Staff from govt and local agencies Resource persons to prepare communications plan Funds for publications, workshops, materials and facilities Govt and donor funds	

4.1 Promote participatory research agendas within research institutes. 4.2 Identify environment friendly, low-cost, low-risk hatchery, nursery and grow-out culture systems in coastal areas based on identified livelihood objectives of poor and market demand. 4.3 Identify co-management practices for aquaculture and aquatic resources in inland and coastal areas that support livelihood objectives of poor people. 4.4 Improve (where needed) existing technology and management practices for inland aquaculture and species based on identified livelihood objectives of poor and market demand. 4.5 Prepare indicators for assessment of the environmental and social impacts of new aquaculture technologies. 4.6 Develop and disseminate aquatic animal health management measures for small-scale aquaculture	2002-onwards	Staff from govt and local agencies and research institutions Resource persons. Research funds Funds for publications, workshops Govt and donor funds	

Action plan for 2001

The implementation will follow in accordance with the Government HEPR schedule for the period 2001-2010 and some indicative implementation times are included in the logframe above. There is a need for more detailed planning to be done on an annual basis. The following outlines the activities planned for 2001.

(1) MOFI will establish the SAPA Committee and the SAPA Implementation Support Unit (ISU) in June 2001.
(2) ISU will print and widely disseminate the SAPA Strategy document in Vietnamese and English during July/August.
(3) Task Force Group assisted by some experts will draft a 5-year SAPA logframe and a detailed workplan for 2001.
(4) Continue capacity building for livelihood analyses (LH) and implementation of the analyses in 2/3 selected pilot areas. The analyses will form the basis for initiation of follow up activities in selected.
(5) Prepare a communication plan and SAPA networking strategy through consultation with key stakeholders for discussion at a national workshop in November 2001.
(6) Prepare an annual report and a workplan for 2002. The workplan will identify the responsibility and inputs of each involved institution, and indicate a gradual phasing in of more activities over the five-year period as experience grows.
(7) The SAPA Committee will call a nation-wide workshop with the overall theme on introduction of the SAPA Strategy during November 2001.

Inputs required for SAPA implementation

Government contributions

The MOFI will provide in kind and cash contributions to support implementation of SAPA. The in kind contributions will include an office for the Implementation Support Unit (ISU), telephone line and furniture. The cash contribution will include an annual allocation of about VND300 million ($20,000) for staff, for daily operation activities as contributions for the SAPA.

These contributions do not include Government contributions for each formulated pilot project/activity the details of which will be prepared during the implementation period.

Donor contributions

Donor assistance will be requested to support the holding of workshops, training activities, office equipment and start up operational costs for SAPA and the field activities. Some personnel and *ad hoc* international expert assistance will also be required, based on detailed needs to be elaborated.

The local interventions in target areas will be formulated through a participatory process and submitted to government and donor for funding support. The government will undertake further discussions and negotiations to explore funding mechanisms for supporting poor people through SAPA during 2001.

Annex 5: Speeches

Welcoming Remarks

By
Dr. Ta Quang Ngoc,
Minister, Ministry of Fisheries

Vice Ministers, your Excellencies, ladies and gentlemen, good morning!

I would like to welcome all participants to this Scoping Meeting. A special thanks to representatives from government agencies, provincial authorities, donor agencies and regional and international organizations for your support and time to participate in this meeting. The participation of such a large group is very encouraging to me as it shows the strong interest in this important topic of poverty alleviation through aquaculture.

I am pleased to inform you that the Government of Vietnam is giving a high priority to poverty alleviation. These policies are being now adopted in the fisheries sector.

There are certainly considerable challenges in implementing these policies, and particularly in the fisheries sector. There are several million people living in coastal and inland communities in Vietnam who are extremely poor, but who certainly can benefit from improved management of fishery resources and sustainable aquaculture development. For example, small-scale inshore fishermen, whose livelihoods are declining with dwindling inshore fish stocks, rank among some of the poorest people in Vietnam. Alternative livelihoods, such as aquaculture, are urgently required for these fishermen and their families. There are also large numbers of poor people in the mountain areas who urgently need the protein and income that can be provided through aquaculture.

Fortunately, there are some good examples already, which demonstrate the potential of aquaculture to poverty alleviation. I hope this meeting can identify strategies that work and recommend an approach, which will ensure such successes are duplicated more widely. I also look for new strategies to help accelerate the positive contribution of aquaculture to the income and food of people in rural areas.

Until recently, UNDP and a few other donors have offered support for poverty alleviation through aquaculture. Recognizing the importance of aquaculture for poverty alleviation, MoFI has decided to make a long-term commitment through establishing a special program named "Sustainable aquaculture for poverty alleviation". I note that following the success of the UNDP supported project, there is increasing interest of donors in aquaculture for poverty alleviation. This trend is very much welcomed.

The MoFI are looking forward to the outcomes from this Scoping Meeting. We view it as very significant in raising awareness of the importance of aquaculture in improving poor peoples livelihoods and to build a special program for poverty alleviation. I expect it should come up with practical recommendations and promote

further cooperation with donors in implementation of this program, providing increased momentum and direction in our efforts towards poverty alleviation for our people. I personally assure you that your recommendations and the program will receive the highest support from the Government and I look forward to a similarly high level of commitment and support from the donors.

I would like to thank all the various agencies and individuals who have contributed to the organization of the meeting, and especially the hard working Organization Committee, Steering Committee and the Working Group. I would like especially thanking NORAD for their much appreciated contribution and vision in supporting the meeting. Thank you Vice Minister from MPI for your participation and responsibility as a Vice Chairman of the Organization Committee. Thank you also to the participants from MARD, MOLISA and MOSTE. It is a pleasure to note such support and expression of cooperation from other Ministries which augers well for future inter-sectoral cooperation.

Lastly, I would like to give special thanks to the Provincial authorities and the farmers participating in this meeting. Many of you are dealing with poverty on a day-to-day basis. Thank you for your participation. I hope that the program being developed during this meeting, and follow up actions, will support you in your important tasks.

I look forward to and wish you all an enjoyable and successful meeting.
Once again, welcome and good morning!

Government Policy on Hunger Eradication and Poverty Alleviation

By
Mr. Lai Quang Thuc, Vice Minister,
Ministry of Planning and Investment

In the process of renovation and integration, Vietnam's economy has made some remarkable achievements: the GDP has constantly increased; export earnings also greatly increased; infrastructure has been continuously strengthened; international relations with other countries has widened and living standards have become higher and higher. The poverty rate decreased from 58% in 1993 to 37% in 1998 (as noted by the World Bank in the report -Vietnam attacks Hunger and Poverty). However, despite the acceleration in economic growth, Vietnam remains among the poorest countries in the world. The average income of most of the population is still very low, especially among the households living in rural areas.

At the 8th Congress of the Communist Party of Vietnam in 1996, a decision was made to give a high priority to hunger eradication and poverty alleviation as part of the social and economic development program for the country. The objective of the program was to decrease the poverty rate to less than 10% by the end of year 2000. The government has adopted a number of policy measures to fulfil this objective. For example, the Bank for the Poor was established and became operational in 1996, to provide low interest credit for poor people to develop their production systems; a program coded "327" was initiated with the aim of "greening barren" lands and hills"; a "773" program for "exploitation of wetlands along rivers and coastal lines for aquaculture" was started; and a program "120" on " Job creation".

On 27th July 1998, the Prime Minister through Decision 133/1998/QD - TTg approved the national-wide program on "Hunger eradication and Poverty alleviation" for the period 1998-2000. In the first years, the program mainly focuses its priority on the poorest communes in remote, mountainous and boundary areas and islands. The program is supporting projects for:

- Infrastructure building, settlement and resettlement.
- Job creation and diversification of production systems.
- Providing loan for the poor.
- Improving education systems.
- Development of public health services.
- Providing extension services for the poor in agriculture, forestry and fishery sectors.
- Institutional capacity building for the local and central agencies involved with poverty alleviation.
- Settlement, rehabilitation and supporting for new economic areas.
- Supporting ethnic groups in special circumstances.

An amount of about 10,000 billion VND (USD 700 million) has been allocated by government for this program during a three-year implementation period from 1998 to 2000.

On 31 March 1998, the Prime Minister signed Decision 135/1998/QD-TTg to approve the Program on "Socio-economic Development for the most poorest communities in remote and mountainous areas".

The objective of the program is to completely eradicate chronic hunger of the poorest people in mountain areas over the period from 1998 to 2000 and to decrease the proportion of poor people to 25% in these poorest communes by the year 2005.
The program has 5 generic tasks, namely:

Planning, settlement and resettlement of local populations in some areas, and provision of livelihoods where it is possible; encouraging agriculture and forestry production, and processing and marketing, with the purpose of fully mobilizing existing natural resources, creating local employment opportunities and sustaining people's livelihoods; developing rural infrastructure in a framework of master plan and fitting in with the resettlement and settlement program. The first priorities are on road and transportation, provision of clean water supplies and electricity supply, including small-scale hydroelectric power; planning and developing commune centers with priority on infrastructure for public health services, education and training, trade, handicraft and small scale industry and radio/TV communications; and developing human resources at local and commune level to improve administration and economic management skills for poverty alleviation and to support social and economic growth.

To fulfil these tasks, the government of Vietnam has developed a policy framework that deals with land use and property rights; credit and investment; human resources development; tax incentives; and others. The program has identified responsibilities of organizations within Vietnam, at all levels, and encourages international donors to support implementation of the program in appropriate and effective ways.

For the period 1999-2000, an amount of VND 1,800 billion (USD 130 million) is allocated for the program. The Bank for the Poor has also provided an amount of VND 4,086 billion (USD 300 million) for the poor sector. Besides, international donors have also provided strong support for poverty alleviation. Presently, the Government of Vietnam is collaborating with the World Bank to prepare a long-term strategy entitled "Vietnam attacks poverty". Some of the projects being implemented include the IFAD project in Quang binh, Tuyen quang and Ha giang provinces; reforestation projects under SIDA support and World Bank projects on rural development in six mountain provinces.

These achievements have come from the policy promulgated by the Communist party and Government of Vietnam, as well as great efforts given by our people and effective support provided by the international community.

Nevertheless, hunger elimination and poverty reduction remains an urgent issue in Vietnam, especially in the rural areas where about 80% of our people are living. The rural area provides 70% of the labor force for the country, and is where almost 90% of the poor people live. The average income in rural areas is still very low and estimates

suggest only 70% of labor time is used for earning activities. Furthermore, the unemployment rate is high and showing an increasing trend. Many households in rural areas face problems due to limited arable land, lack of investment and inadequacy of primary technological knowledge. Therefore, the opportunity of these households to overcome poverty is so far beyond reality.

Aquaculture is considered to have realistic potential for poverty alleviation in many inland and coastal areas of the country. The Government of Vietnam recognizes this potential and has supported planning, development, research and extension activities to promote aquaculture for poverty alleviation. Annually, a considerable amount has been budget from government, supplemented with some international financial sources, for improvement of infrastructure such as hatchery networks, strengthening extension services, and for post-harvest handling and processing. Nevertheless, the allocated funds have so far not met the increasing demand, resulting in low effectiveness in use of existing resources for benefits of the poor.

In the policy framework for socio-economic development, the Government of Vietnam now considers poverty alleviation as the highest priority to ensure that every body in society will have enough food, clothes, and a better life. Integration of policies in the economic and social fields is essential for fulfilling the targets of the program. The government recognizes that aquaculture already plays an important part in the social and economic development of the country, and in rural areas in particular. It also recognizes that there is a great potential for aquaculture to make a much bigger contribution to poverty alleviation.

This meeting is very timely, and the Ministry of Planning and Investment certainly looks to the outcome of this important scoping meeting. The discussions and recommendations will I am sure be important in helping to identify strategies for further promoting aquaculture to support poverty alleviation.

The government highly appreciates the support and assistance of the donor society in the past and looks forward to further support and active involvement in aquaculture development for poverty alleviation.

To end my speech, I would like to express sincere thanks to all you for your participation at this important Scoping Meeting. Thank you for your attention. I wish the Meeting success.

Policy Priorities in Aquaculture Development Towards Poverty Alleviation

By
Dr Nguyen Viet Thang, Vice-Minister,
Ministry of Fisheries, and
Chairman of Steering Committee of Scoping meeting

Minister, Vice-Minister, your Excellencies, ladies and gentlemen.

I would like to repeat the words of the Minister, Dr. Ngoc, and welcome all participants to this scoping meeting. The Ministry of Fisheries is very pleased with your strong interest in the meeting and we hope very much that you will find it interesting and productive.

The meeting addresses one of the most important challenges, which we have to face today. Vietnamese people –like many countries in Asia– depend on fish and fisheries products as an important source of food and income. In Vietnam, the livelihoods of many people depend on the countries aquatic resources. More than 20 million people live along the long coastline, and many are among the most vulnerable and poorest in Vietnam. As inshore fishery stocks declines, due to loss nursing grounds and over-fishing, such people have major problems in earning a livelihood, and face an unsustainable future.

Similarly poor situations occur with more than 10 million population living in mid and highland areas throughout the country, due to limited availability of agriculture land, which tend to be poor quality and unproductive. Thanks to a combination of over-fishing and habitat loss, our inland fisheries, once an important sources of subsistence food for rural people, have deteriorated, badly affecting the livelihoods of poor rural communities, including some of the poorest members.

What can be done? This is a simple question but one that does not have a simple answer.

We have to look for solutions and improve our efforts at various levels -from the central government, to the level of the farmer and fishing households. Certainly we have to give emphasis on better management of our aquatic resources –particularly inshore fish stocks and coastal habitats. But also, we need to develop aquaculture – as populations increase and the demand for fish and fisheries products rises - there are few alternatives.

As many of you will know, aquaculture is a source of food, income and a means of diversification of earnings among farm households. Aquaculture can improve livelihoods through the direct involvement by rural people in aquaculture production as well as through employment/involvement in support activities, such as fry nursing, feed collection, and transporting of seed and marketed products. We know that aquaculture can be a powerful tool to alleviate poverty. In the mountain areas of Vietnam, aquaculture has helped alleviate poverty among ethnic communities, a fact recognized by the United Nations. It is with particular pride that I can inform you that

one of our women aquaculture farmers – Mrs. Mai from an ethnic community in Lai Chau province was honored by the United Nations during World Poverty Day. Internationally, then, the role of aquaculture in poverty alleviation is being recognized. Most recently, I was fortunate to attend the Conference on "Aquaculture in the Third Millenium" which clearly recognized the potential of aquaculture for poverty alleviation and rural development. The Bangkok Declaration –prepared during the meeting states for example, "the practice of aquaculture should be pursued as an integral component of development, contributing towards sustainable livelihoods for poor sectors of the community, promoting human development and enhancing social well-being".

It is pity that the importance of aquaculture for poverty alleviation is not more widely recognized in Vietnam. For example, there are several donor supported rural development projects, which do not even include aquaculture as a component.

It is clearly time to take action.

Recognizing the need for a concerted attack on poverty through aquaculture, the Ministry of Fisheries has decided to make a long-term commitment through establishing a special program named "Sustainable Aquaculture for Poverty Alleviation (SAPA)". This program, which will be further discussed and developed during this Scoping Meeting, based on your ideas and suggestions, will be designed to focus specifically on poverty alleviation through aquaculture, and improved aquatic resources management. It will allow the Ministry to give special attention to this important issue, and we hope raising the profile of aquaculture as a tool for poverty alleviation, and allowing us to develop specific strategies to make out efforts more effective.

This Scoping Meeting on "Sustainable Aquaculture for Poverty Alleviation" is therefore very important.

I expect the meeting to exchange experiences and identify and focus on strategies for poverty alleviation through aquaculture and improved aquatic resource management, and lead eventually to better partnerships between all -including communities, government agencies and donors -for livelihood improvement among poor communities. I welcome the opportunity provided by this meeting to develop the concepts of the program.

It is pleasing that there are participants from various backgrounds, agencies, and government departments from central and local level. There are also farmers present, as well as the supporting research institutes, Universities, some NGOs and international donor agencies. It is very pleasing to see such a diverse group showing interest in this topic, and is a promising start for the program.

I would like to emphasize and make it very clear at this stage that the Ministry expects the program to continue in a very open way, and to promote cooperation among interest and committed partners. It is not intended to duplicate or compete with other projects or activities. Rather it is intended to be an umbrella program to help focus our efforts towards poverty alleviation, within which various activities and projects can come together, participate, and share experiences and expertise, based on the common

goal of poverty alleviation. Whilst the program will be based on the Ministry of Fisheries, the program should be designed in a decentralized way, with good opportunities for cooperation. It needs to find an ownership with the local communities and local government agencies with direct responsibility for working at the grass roots.

The vision of the program should be to ensure that aquaculture and the management of aquatic resources are effectively used for poverty alleviation and the improvement of livelihoods among coastal and inland peoples in Vietnam. This will require an approach that allows the problems of poor people to be properly understood, and project interventions designed based on such understanding. The ideas and suggestions from this meeting will be very important in working out some of the approaches required.

There are a number of other issues which need to be addressed for the successful development and implementation of a program focused on sustainable aquaculture for poverty alleviation. Among these issues include the need to improve awareness of aquaculture as means of improving livelihoods; the need to take account of the large number of households involved; the need for capacity building among farmers, extension services and research institutes; the need to give more focus on gender and equity issues; problems in obtaining inputs such as credit and seed for small-scale producers; the problems associated with a degraded natural resource base in coastal and inland areas, and reduced biodiversity; and means to allow participation by poor households in aquaculture development planning. I am sure you will come up with more issues.

What I hope the meeting will come up with is a comprehensive strategy to develop farmer and institutional capacity, management strategies and appropriate technologies and farming systems, which support effective application of aquaculture to sustainable livelihoods and rural development. This scoping meeting can and should be a start towards better understanding and defining of major issues to be addressed. It should also –and this is very important -identify some specific actions for follow up.

I can assure you that the Ministry of Fisheries, and I hope the other ministries and agencies represented here, will actively follow up on the recommendations from the meeting. The Ministry will establish a program committee, which will have the responsibility to oversee the implementation of the program. In the spirit of partnership, I would also request that donors give serious attention to participation and cooperation in the activities of the program in the coming months and years.

In closing I would like to take this opportunity to thank all the various agencies and individuals who have contributed to the organization of the meeting. The Organization Committee, Steering Committee and the Working Group have done an excellent job in preparing for the meeting. I would like to thank NORAD for their support to the meeting, and also NACA for providing staff members to support the preparatory work. I am also pleased to learn that this national activity is one of the planned activities of the NACA/FAO Regional Program on Aquaculture for Rural Livelihoods. Vietnam looks forward to further close cooperation with this regional activity. I would also like to thank Mr Thao, my friend and the Vice Minister from the Ministry of Planning and Investment for your cooperation, and also the participants

from MARD, MOLISA and MOSTE. We look forward to working closely with you in the future. Again, special thanks are due to the Provincial authorities and the farmers participating in this meeting. As has been emphasized by Dr Ngoc, we appreciate that many of you are dealing with poverty issues on a day-to-day basis. We value your input to the meeting, which I am sure will be based which will help provide a solid practical understanding of the major issues. We certainly look forward to working with you in the future, as the program develops and enters a practical implementation phase.

With these few remarks, and on behalf of the Ministry of Fisheries, I would like to thank you again. I look forward to and wish you all an enjoyable and successful meeting.

Thank you and good morning!

Closing Speech

By
Dr. Nguyen Viet Thang, Vice-Minister, Ministry of Fisheries,
and
Chairman of Steering Committee of Scoping meeting

Ladies and Gentlemen. It is a great pleasure for me to be here at the close of this meeting. Although I have not been able to be with you throughout all of the past two days, due to other urgent business, the Minister Dr Ngoc and I have received regular reports on the meeting, and have been very pleased to hear of the great progress made during the meeting. We regard the meeting as very successful and are very pleased with the outcome.

It is good to see such a large and active group come together for this meeting. We first planned for a meeting of about 60 people, but over 130 arrived on the first day. Many people have stayed on and actively participated in the presentations and active discussions. This shows the very keen interest and importance of this subject – aquaculture for poverty alleviation. I would like to thank all of you, participants from provinces, farmers, concerned agencies, donors and others for your constructive and positive contributions to the meeting, and for coming up with some very good recommendations. Thank you for your hard work.

I would assure you that the Ministry of Fisheries takes the conclusions and recommendations from the meeting very seriously. I am pleased that the meeting has fully endorsed the idea of the SAPA program and has made many good recommendations for its establishment and implementation. From the side of the Government of Vietnam, I can assure that the government strongly support and will take responsibility for the coming program. I would request donors to make a similar commitment and help support the SAPA. We feel it is very important to take action immediately following the meeting. To show this commitment and concern for quick follow up, the Ministry of Fisheries will mobilize existing resources this year to develop and implement the program.

This will help us maintain the momentum from the meeting, and materialize this important meeting. In order to help further implementation, MOFI will establish an interim working group, which review the materials and further develop the SAPA program. We plan that an effective and workable strategy for implementation of the program framework will be ready as soon as possible.

In closing, I can assure that the Ministry of Fisheries will give this program a very high priority, and we expect that its further development will contribute to poverty alleviation in Vietnam based on the wide range of recommendations identified during this important meeting.

Thank you again for your contribution to a successful meeting. With these few remarks, I declare the meeting closed, and wish you all a safe journey home.

Annex 6: Technical papers submitted for the meeting

Livelihood Status and Needs of Inland and Coastal Communities in Relation to Aquaculture

By
Dr. Tran Mai Thien, Director,
Research institute for aquaculture No1
Dinh Bang, Tien Son Bac Ninh
Email: ria1@hn.vnn.vn;
Phone: 84-4-8271368 Fax: 84-4-8273070

In the process of integration and innovation, Vietnam's economy has achieved significant success, but although having experienced an increased economic growth, the Socialist Republic of Vietnam still remains one of the poorest countries in the region.

The high population density is one of the huge problems the Vietnamese Government has to face. The total area of Vietnam is 330,991 km^2 with a population of almost 76 million, and with a population growth around 1.8% per year (The whole Vietnam Perspective, 1997). Almost all the population is living in rural areas (78%) and is experiencing the first stage of modernization. The poor are distributed throughout the country, but the government has identified 1,700 communes as belonging to the poorest and these are targeted in a poverty alleviation program.

Administratively Vietnam is divided into 8 regions covering the 61 provinces and larger cities as shown in table 1.

Table 1: The administrative division of Vietnam

Region	Number of provinces and cities	Population (million) in 1998*	Larger cities
Red river delta	9	14.9	Hanoi and Hai Phong city
Northwest	3	13.5	-
Northeast	13	-	-
North-midland coastal	6	10.5	Hue city
South-midland coastal	6	8.1	Da Nang city
Tay Nguyen	3	2.8	-
Southeast	9	9.7	Ho Chi Minh city
Cuu Long river delta	12	16.3	Can Tho city
Total	61	75.8	

*Vietnam attacks the poor, 1999. The population of Vietnam estimated of 77 263 000 people on 1st April 1999 (The baseline survey on land and population in Vietnam, International Express, 1999).

The poorest are located in the regions of Northeast, Northwest mountainous, North-midland coastal and Tay Nguyen areas, which have respectively 10, 3, 6, and 3 provinces. In the Cuu long (Mekong) river delta 3 provinces are ranked as "second poor". These provinces are Ben Tre, Tra Vinh and Soc Trang.

The Standards of Development

A continuous food supply is the major item for consideration in the poor provinces in the mountain and coastal regions. The overall estimated agricultural production as current value is presented in table 2.

Table 2: Agricultural production in the regions in 1997

Region	Number of provinces	Total agricultural production value (billion VND)	Provincial average (billion VND)
Whole country	61	98852.3	1620.5
Northeast mountains	10	7022.2	702.2
Northwest mountains	3	1935.9	645.3
North midland	6	10179.8	1696.6
Tay nguyen	3	5429.0	1809.7
The poor provinces in the South	3	6856.0	2285.3
Cuu long river delta	12	32758.1	2729.8

The Northeast and Northwest mountainous provinces have a much lower agricultural production compared to the whole country in average. In addition, the agricultural production in the three poorest provinces in the South does not reach the Cuu long river delta standard.

A standard of food intake per individual is often used when considering the target of food stability in Vietnam. The standard is measured as the total consumption of rice in kg for one person in one year. This figure is below the average of the country in the mountain and coastal provinces. Although agriculture is the main source of income in the poorest provinces in Cuu long River delta, the food intake per person is still around 200 kg below average (Table 3). Definitely, low rice intake will effect on food security and cannot provide enough resources for developing other livelihoods such as aquaculture, cultivated forest and livestock raising.

Table 3: The average volume (kg) of consumed rice per person in different regions in 1997

Region	Average consumption (kg/person)
Whole country	399.1
North-West mountainous	260.4
North-East mountainous	273.2
North-Midland	287.3
Tay Nguyen	264.9
The 3 poor provinces in Southern	639.1
Cuu long river delta	841.5

Forestry is an important source of income in mountain provinces, s.a. in upland of Northern, North-Midland and Tay nguyen provinces, which has higher production values than the average province (Table 4). However, forestry cultivation contributes only with 4.8% of the production value from the agri-forest-aquaculture system. Therefore, although located in mountain areas, these provinces cannot rely only on forestry but they also need an alternative production. There are 3 provinces in Cuu long River delta, which are identified as poor and which have a low forestry production.

Table 4: The value of forestry production in 1997

Region	Total forestry production value (billion VND)	Provincial average (billion VND)
Whole country	5447.8	89.3
North-West mountainous	536.9	179.0
North-East mountainous	1253.7	125.4
North-Midland	1075.8	179.3
Tay nguyen	377.7	125.9
The poor provinces in South	111.4	37.1
Cuu long river delta	884.5	73.3

In addition, because of hunger and poverty increasing forests destruction is experienced (Table 5) which is resulting in a reduced output of forestry products.

Table 5: Forest destruction (ha) in the different regions

Region	1996	1997	1998
Whole country	5527.2	7123.3	20475.0
North-West mountainous	155.0	278.3	2944.4
North-East mountainous	323.7	291.7	1725.3
North-Midland	121.5	69.3	747.7
Tay Nguyen	2148.5	3001.5	91.4

Fishery and aquaculture productions can contribute to increase the income of people in the above regions, particularly in the coastal and Southern provinces. The value of fishery and aquaculture production in the poor regions is showed on table 6.

Table 6: Value of aquaculture production and yield in 1997

		Fishery production value (billion VND)		Yield of aquaculture (tons)	
Region	Number of provinces	Total	Provincial Average	Total	Provincial Average
Whole country	61	16344.2	267.9	414593	6796.6
North-West mountainous	3	40.0	13.3	2728	909.3
North-East mountainous	10	127.3	12.7	10847	1084.7
North-Midland	6	962.3	160.4	22133	3688.8
Tay nguyen	3	34.8	11.6	2587	862.3
The poor provinces in South	3	2599.2	866.4	75126	25042.0
Cuu Long river delta	12	9952.6	829.4	259348	21612.3

Data collected show that the income of people from aquaculture is low in the mountain areas, however, due to the long coastline and the aquaculture development there, the mid-northern region do produce almost 60% of the whole production of the country.

The high potential of aquaculture could be promoted to compensate for the weak economic livelihoods in Cuu long river delta provinces.

In the above-mentioned poor areas there is also a lack of industrial development compared to the average of the whole country. There is especially a lack of industrialization in the Southeast region (Table 7).

Table 7: The industrial production value in 1997 compared to previous of 1994

Region	Number of provinces	Total production value (billion VND)	Provincial Average (billion VND)
Whole country	61	134,419.7	2,203.6
South-East	9	68,222.4	5,780.3
North-West mountainous	3	398.4	132.8
North-East mountainous	10	5,198.5	519.9
North-Midland	6	4,401.6	733.6
Tay Nguyen	3	807.4	269.1
The poor provinces in South	3	2,556.0	852.0

The poverty of the regions also influences the road and waterway transportation capacities in these regions (Table 8).

Table 8: The passengers and goods transport by local transportation in 1997 (road and waterway)

Region	Number of passengers (Million passengers)		Volume of goods (Million tons/km)	
	Total	Provincial Average	Total	Provincial Average
Whole country	673.2	11.04	7702.6	126.3
South-East	265.6	29.51	1118.8	124.3
North-West mountainous	3.4	1.13	60.1	20.0
North-East mountainous	11.4	1.14	240.4	24.0
North-Midland	26.7	4.45	956.2	159.4
Tay Nguyen	5.6	1.87	254.0	84.7

For coastal provinces in North-Midland, the average volume of transported goods by local transportation is relatively high due to good road and waterway infrastructures.

Telecommunication systems in poor areas are less developed as well. Table 9 shows the number of telephones in 1997.

Table 9: Number of telephones in different regions in 1997

Region	Number of telephones	Provincial Average
Whole country	1,593,863	26,129
Northeast mountains	61,263	6,126
Northwest mountains	14,582	4,861
North-Midland coastal	90,094	15,016
Tay Nguyen	36,731	12,244
Poor provinces in Cuulong river delta	36,391	12,130
Hanoi capital	-	280,536
Ho Chi Minh city	-	358,856

The figures indicates that the number of telephones in the poor provinces and regions are much lower than the average of the whole country. The total number of telephones in 25 poor provinces account only for 86% of the total number of telephones in Hanoi.

Due to undeveloped economy in above-mentioned regions, average income is still very low in general. Table 10 shows that the monthly income per person in Red River delta is fairly high compared to the other poor regions. The Northern mountain provinces have low income, especially in the 3 provinces in Tay Nguyen

Table 10: Comparison of monthly income/person in different regions (VND) Data from: Actual situation of industrialization and modernization in Agriculture in Vietnam, 1998.

Region	1994	1995	1996
Whole country	168,110	206,100	226,700
North-high and midland	132,360	160,560	173,760
Red river delta	163,340	201,180	223,300
North-midland	133,000	160,210	174,050
Midland Coastal	144,720	176,030	194,660
Tay Nguyen	197,150	241,140	265,600
South-East	275,340	338,910	378,050
Cuu long river delta	181,650	221,960	242,310

Apart from income, there are other indicators such as housing, roads, medical aid centers, schools, power supply and clean water source which also shows the living standard of the inhabitants (Table 11).

Table 11. Some rural infrastructure facilities by region (1/7/1994)

Facilities	Whole country	Red river delta	North-Midland and highland	North-Midland coastal	Taynguyen	Cuu Long river delta
Total communes	8791	1694	2624	1624	457	1130
Percentage of communes having:						
Electricity	60.4	98.2	36.7	61.0	29.5	67.3
Road	87.9	99.4	81.4	93.2	96.1	68.0
Medical center	93.2	99.8	85.7	97.2	84.0	98.7
Primary school	98.0	100.0	99.8	99.9	100.0	99.8
Secondary school	76.6	99.1	64.2	86.8	50.1	74.7
Nursery	33.6	85.7	19.9	40.5	18.6	4.5
Pre-school education	76.8	97.2	55.2	90.0	75.7	72.7
Radio station	38.6	83.6	7.1	22.5	14.9	65.8
Market	54.2	61.8	37.1	57.2	33.0	70.7
Electric Transformer station	49.3	96.5	26.6	57.9	12.5	31.9
Household in total (*1000)	11466.9	2756.6	2012.6	1765.6	431.7	2412.9
Percentage of household using:						
Electricity	53.2	89.5	50.4	55.5	19.8	25.0
tap-water	1.0	0.7	0.3	0.3	0.3	1.3
Well-water	65.2	67.3	71.3	85.5	75.5	21.6
Total house (*1000)	12114.1	2567.6	2050.3	2067.3	439.9	2583.3
Percentage of housing being considered:						
Strong	11.94	27.27	9.58	9.60	4.74	7.50
Semi-strong	45.58	56.13	54.03	57.32	50.31	18.60
Simple	42.47	16.6	36.11	33.08	44.96	73.90

Among culture and personal travel items, radio, television, motorbikes are the most favored. The percentage of households owing radio, TV or motorbike is 37.30, 21.22, and 9 respectively. These figures are for the whole country but there are some differences in between the regions as presented in table 12.

Table 12: Average values on percentage of households having radio, TV or motorbikes in different regions.

Region	Radio	TV	Motorbike	Notes
Whole country	37.30	21.22	9.00	
North-midland and highland	44.47	20.25	6.85	* Including Bac Giang, Quang Ninh, Bac Ninh
North-Midland coastal	34.57	11.12	3.98	
Tay Nguyen	31.78	14.79	13.53	
Cuu long River delta	36.06	25.53	7.56	For comparison

Within "Culture and Travel Items" the estimated averages of North-midland coastal provinces are under the country average level. The West-center region is low too, but the number of motorbikes here is higher than that in other regions. It maybe due to

lack of waterway transport, less developed road system; motorbike has been used as an alternative.

Poverty and Aquaculture Related Issues

The above data do not still fully reflect poverty in Vietnam. For a better understanding of the extent of the problem, a survey at household (family) level was carried out. According to the survey, there are 2,808,158 poor households distributed in all corners of the country, with the main concentration among ethnic minorities and coastal fisherman. The distribution can be seen in table 13.

Table 13: Percentage of population living under the poverty limit in different regions (Poverty alleviation strategy in Vietnam, 1999).

Region	1993	1998
Northern mountain area	79	59
Red river delta	63	29
North Central	75	48
Coastal Center	50	35
West Center	70	32
South East	33	8
Cuu long river delta (Mekong river delta)	47	37

It should be noted that the poor mainly concentrate in north mountainous provinces, north center and as well as many in Cuu long River delta where over 70% are categorized as poor people. Recently, poverty has been reduced in the country compared to 1993, however it has been reduced unevenly in the different regions. In Red River delta, the poverty rate has decreased with 34% while the decrease is only 10% in the Mekong river delta (Cuu long river delta). Three regions with the highest ratio of poor people in 1993 were North mountainous, North central and Tay Nguyen. Poverty have decreased in these areas but still there is a large number of poor people in the regions, namely, 59%, 52%, and 48% in North mountain, Tay nguyen and North central respectively. Poverty reduction is slowest in the North mountain provinces.

A standard has been made to measure the level of serious poverty; it shows the lack of money in poor households compare with poverty standard. Moreover, it also shows the poverty status in the North mountains, Tay nguyen and North central are more critical than other areas (Table 14).

Table 14:"Indicator distance" of poor in regions

Region	1993	1998
North mountain	26.8	16.8
Red river delta	18.8	5.7
North Central	24.7	11.8
Coast central	16.8	10.6
Tay Nguyen	26.3	19.1
South-East	9.2	1.3
Cuu long river delta (Mekong river delta)	13.8	8.1
Average in the whole country	18.5	9.5

The average income per person (Table 10) in Tay nguyen is the second highest ranking after Southeast. However the difference in rich and poor is very big and the total number of poor is very high.

Table 15 shows the difference between high and low income groups

Table 15: Imbalance between highest and lowest income groups in division (each group of 20% household) (Result of socio-economic household survey, 1999)

Region	Year	Lowest income group (.000 VND)	Highest income group (.000 VND)	Level-fold
North-Mountain and Midland	1994	57.63	301.08	5.22
	1995	69.35	393.99	5.68
	1996	73.21	444.28	6.07
Red river delta	1994	66.30	367.84	5.55
	1995	76.31	368.07	6.13
	1996	79.85	523.06	6.55
North Central	1994	57.15	299.69	5.24
	1995	66.71	382.19	5.73
	1996	66.87	408.67	5.93
Coast central	1994	63.09	308.97	4.90
	1995	74.66	408.52	5.47
	1996	80.13	454.68	5.67
Tay Nguyen	1994	53.12	536.01	10.09
	1995	53.76	683.33	12.71
	1996	56.40	724.12	12.84
South-East	1994	93.65	693.63	7.41
	1995	115.38	873.07	7.57
	1996	118.61	934.70	7.88
Cuu long river delta	1994	71.75	436.59	6.08
	1995	88.20	560.58	6.36
	1996	89.52	576.16	6.44

The higher the income in the two groups, the larger imbalance between highest and lowest groups. This is especially seen in Tay Nguyen.

Beside the division of poverty in geographic regions, it should be noted that the poor people are farmers. The number of poor people is around 61% of the total population in Vietnam.

Reasons of Poverty

- In rural areas there is a lack of available land, which has led to redundancy of working labor and an increased unemployment. The percentage of the population working as farmers is still around 80%.
- Natural resources as land, water and forests have not been soundly managed and exploited.
- Increase of agricultural production is always lower than that of industry and service. This causes disadvantages in price fluctuation for agriculture production and farmers. For example the food prices only increased 0.4% from December 1996 to December 1997, while non-food price and service increased 4.4% and 8.1% respectively in the same period.

From the mentioned reasons, one mean of poverty alleviation could be the development of production fields, applying of science, technical achievements and management capacity to all production fields including aquaculture. Aquaculture holds a high potential to develop, especially in poor areas. For example, water surface

area for aquaculture in mountainous and mid land area in 1997 was around 50,000 ha in the Red river delta; north and west center having 15,000 and 20,000 ha respectively. Only three poor provinces in Cuu long River delta reach 40,000 ha of water surface area. However, in 1997 aquaculture productivity in Red River delta was 3 times higher than the production from the mountain and mid land region with respectively 61,160 and 21,655 tons.

To alleviate poverty in Northern central and Cuu long river delta provinces, the importance of aquaculture is higher because of the high potential in the regions. Besides fresh water culture and brackish water there is also the possibility of marine culture. The living standard of people in these areas will be improved if aquaculture becomes more applicable.

Conclusion and Recommendation

- Examining socio-economic data show that some regions namely, the north mountainous, North Central, Tay Nguyen and some provinces in the Mekong river Delta (Ben Tre, Tra Vinh, Soc Trang) are less developed than other regions in the country. These areas need a priority when defining a strategy for poverty alleviation.
- Number of the poor, different level of poverty and different income in these areas is also relatively high. There should be synchronized efforts to help these areas of poverty.
- In the above-mentioned poor regions, one of the measures to alleviate poverty is to help farmers to develop aquaculture.
- The Government needs to have policies involving infrastructure investment and encouragement and increased extension activity as well as to help implement aquaculture for the poor.
- Sponsors and investors should have project concerning the development of aquaculture in poor areas.

Potential of Aquaculture for Poverty Alleviation in Vietnam

By
Mr. Tran Van Quynh,
Vice-director, Dept. of Science and Technology,
Ministry of Fisheries
National Project Director of UNDP Mountain Aquaculture Project

Role of Aquaculture in Rural Development

Aquaculture contributes with about 30% of the total fish production of the country and has increased rapidly over the last decade from 312,530 tons in 1989 to 374,472 tons in 1993 and 537,870 tons in 1998. The larger share (67%) of the present production is contributed from freshwater aquaculture, while coastal and marine productions constitute the rest.

Livelihood Creation, Poverty Alleviation and Food Security

Surveys conducted by various institutes within the last five years indicate that more than 30% of rural households in the north and more than 70% in Mekong delta are involved in aquaculture practices of different types. These can be integrated garden-fish pond-livestock pen (VAC-system), rice-fish/shrimp culture, fish (lobster) cage culture, shrimp–fish rotation culture, mollusc culture, seaweed culture, etc. In remote areas (isolated mountains or coastlines), which are inaccessible markets, local household aquaculture is an effective means of production to provide quality protein for the poor. Surplus production is sold at the local markets for cash income. Several success stories from poor households are recorded in popular publications.

The famous Hmong family Hoang Thi Mai, of Lai Chau mountainous province, who recovered from poverty situation through aquaculture, was awarded the UN medal on Poverty Alleviation Day in 1997.

A survey made by the National Institute of Nutrition of 350 households in Hanoi suburban and Ha Nam Ninh province (1989) found that the overall per capita daily food consumption of the integrated VAC-farm households was much higher than that of reference groups (Nam et al. 1999). Also fish consumption was 39% higher compared to those households without fishpond and integrated system.

Income Generation

The VAC farming system, rice-fish/shrimp culture and small-scale cage culture are the most popular aquaculture practices, and they contribute with about 30-70% of the family income.

To understand the economic situation of households involved in aquaculture, an analysis of the data from 65 families in Red River delta practicing combined agriculture and VAC has been carried out. The results of this analysis show that although agriculture is considered the main activity of the households, the income from this sector is not so high. Only in the case of the high productive areas ("the intensive zone"), where rice is double-cropped and high yields up to 12 tones per hectare per year are attained, the income from the agriculture sector (VND 7.502

mill/ha) is more or less the same as the one from VAC (VND 7.734 mill.). In the two "less productive" (agricultural) zones - suburban and low-lying land - income from VAC (VND 6.198 mill. and VND 7.874 mill, respectively) far exceeds the income gained from the agricultural activity (VND 3.349 mill. and VND 2.865 mill, respectively).

Remarkably, aquaculture makes the largest share of income contribution in the low-lying and intensive zones (about 40-45%) and is on a par with animal husbandry in the suburban zone (35%).

Within rice-cum fish culture systems an analysis shows that net profit is about 1.5-1.6 time higher than in single rice system (Luu et al.1998). Farming systems in brackish water as well as coastal lines for culture of different species such as shrimp, crab, seaweed, molluscs etc., bring even higher benefit. A study involving three coastal communities of three provinces show that the low prolific land, where rice cultivation is not suitable, can be used for aquaculture. The profit from aquaculture could be ten to fifteen times higher than any other cultivation activities. An average income from one hectare of brackish water for rotation of shrimp/crab/fish culture may range from VND 20-50 million.

Job Creation and Social Sustainability

It is estimated that approximately 600,000 people are employed directly and over 100,000 indirectly in aquaculture and related services. In rural areas, most of the family members are involved in small-scale aquaculture either directly or indirectly. The survey carried out by Thin (1999) in two communes (On Luong and Duong Thanh) in Thai Nguyen province indicates that the amount of the family labor for aquaculture ranged from 2.03 working/day/sao[1] (in On Luong) to 17.5 working/day/sao (in Duong Thanh), which is much lower compared with work effort for agriculture crops (25.4 working/day/sao and 33.4 working/day/sao respectively). Still the income contribution from fishpond (20% in On luong and 19.8% in Duong Thanh) is only a little bit less compared with contribution of crop (34.0% and 28.23% respectively).

The share of used working time (standard 8 hour/day) of labor in rural area is quite low 71.13% for whole man and women of which women is 71.18% (General Statistical Office, 1999). In other words, spare working time (free time) in rural area is high, about 29%. In this regard, expansion of aquaculture activities may create additional work for a good number of rural people to use their available free "working" time.

Gender Issues

A closer look at the household aquaculture reveals that the women members of the family play an important role in small-scale aquaculture. In fact, women usually carry out most of the routine activities in aquaculture. Such routine activities are pond keeping, feeding, manuring (fertilization), cutting grasses, care of fish growth, health, fish sale etc. The man (husband) is responsible for construction/renovation and cleaning of ponds, pumping or draining water into/out of the pond (if this is needed), guarding the crop, catching fish, purchasing seed etc. In many cases the man makes

[1] a sao in the north is calculated as 360 m^2

decision upon aquaculture and other activities relating to the fishpond. Meanwhile, the woman often makes the decision on activities she is responsible for. Usually, the man in the family is given much better opportunity to take a part in training programs or any meeting/workshop on aquaculture. Although women are equally involved with aquaculture, opportunities for improvement of their knowledge and experience are very limited. This is because of traditional practices or conditions, in which woman has to take care of the whole family, including cooking, cleaning, children care and their education etc.

Environmental Rehabilitation and Biodiversity Protection

Studies carried out by RIA1 in some fishing communities along the coast line in Quang Binh and Nghe An provinces indicate that a section of the fishing villagers either have left their fishing activities to take up aquaculture or attempt to change if an opportunity becomes available because of the small return from fishing activities. To a certain extent it means that in the future, inshore fishing pressure will be reduced.

Relating to freshwater aquatic resources, enhancement of fishery resources in the lakes, natural water bodies and man-made reservoirs has been improved. Since aquaculture is widely introduced, the households are able to produce increased amount of fish for consumption, the catch from the wild therefore has been either stagnating or reduced. Introduction of fish culture in rice fields is reducing the use of pesticides leading to improved environmental conditions. On the other hand, it is also improving the availability of fish in paddies.

The same effect has been seen for the mixed fish culture/mangrove system or cage lobster culture. Where the combined fish culture and mangrove are well managed, a high profitability is recorded. The results of the ACIAR project in Mekong River delta can be cited as valid evidence. The lobster culture in cages in the central Vietnam has resulted in mass reproduction of lobster fry in the wild to enrich natural stock.

Large population groups are displaced when any hydropower/irrigation reservoirs are constructed. Displaced population face risk to their livelihoods due to loss of their arable land. Most of the reservoirs are constructed in the mountainous areas and as such upland ethnic minority communities are more seriously affected. Finding no other options they are often forced to cut forests and to use the cleared land for agriculture. Such development has lead to large-scale forest destruction and certainly to negative impact on environment by erosion of the barren hills, degradation of land fertility, destruction of habitat of animals including aquatic animals and flora. The experience gained from many reservoirs in Vietnam show that the displaced farmers can easily earn their livelihood from fishery and aquaculture, if adequate opportunity is given to them. In Thac Ba, Nui Coc reservoirs the households are given leases to catch fish and do cage culture. A number of water bodies of the size of few hundred square meters to few hectares are also constructed by the farmers or group of farmers to keep water for daily use, for irrigation of paddies and gardens. These water bodies are also used for aquaculture for earning cash income and food for family members. Such examples are available in the most of the villages in midlands and highlands.

Owning to increase of fish availability through aquaculture, the pressure on wild catch is reduced. In other words, the fish supply is changing from natural resource base to

culture base. This indicates that the negative impact on wild stock due to over fishing will be reduced paving the road for restoration of the natural population.

Aquaculture Case Stories on Micro-scale

There are a number of instances where households or group of households have recovered their economic difficulties through aquaculture. A large number of cases are available throughout the country associated to all culture environments (freshwater, brackish water and marine) and all culture forms such as VAC-systems, rice-fish culture, cage culture and shrimp culture in semi-intensive conditions. Success was achieved with all cultured species such as freshwater carp species in polyculture, tilapia, marine finfish, groupers, shrimp, crab, lobster, bivalves, etc. Short descriptions of some successful farmers are given below.

Inland Aquaculture

A Case with Ms. Hoang Thi Mai, UN award-winner of 'World without Poverty'

Ms. Hoang Thi Mai and Mai Van Mai belonging to an upland ethnic community represent a bright example of recovery from poverty through aquaculture. This family belongs to Hmong community living in Nong bua commune of Lai Chau province. In 1985 their family was forced to move away from Cao bang province to Nong bua, a distance of 350 km due to difficult living conditions. In Nong bua commune, Dien bien town, they were able to acquire a small piece of land for rice cultivation and managed to keep a buffalo, one-two pigs and some chickens/ducks. Though they had a relatively much better life but the shortage of food during the transition period before the new crop could be harvested remained unsolved. Short supply in cash income for daily expenses of the family was another problem. After learning from the neighbors that aquaculture may help to improve their life, Mai persuaded her husband in 1994 to sell the buffalo and a pig and used the money to dam a small creak that converted a narrow piece of land into a pond of about 2,000 m^2. Mai also used a small amount of money to buy fingerlings for stocking in the new pond. For the first time her family had fish for their children and their old parents and also surplus for sell to cover expenses of construction and restocking the pond. One hundred and sixty kilograms of fish were harvested during the first year. Luckily Mai got the opportunity to attend a short training program on aquaculture organized by the UNDP/FAO Project VIE/93/001. She immediately put the knowledge she gained into practice by cleaning the pond, stocking bigger fingerlings following the appropriate rate and continued her culture activities using available resources. As expected it resulted in a better harvest at the end of the year. She got about 400 kilograms of marketable size fish and some smaller ones, which she kept for further growing during the next cycle. It was a great achievement for them. Her family was able to replace buffalo and pigs, which they sold earlier. They were also able to repair the house, paid fees for their children education and bought clothes and covered other expenses. Now Mai's family has the second pond for nursing fingerlings and grow-out. Her family was also able to purchase new amenities such as TV, radio and bicycle. She also exchanged her experiences and practices of aquaculture with other neighbors and friends who showed interest in fish culture.

Coastal and Brackish Aquaculture

A Case with a group of households in village No 3, Tan Thuy commune, Ba Tri district, Ben Tre province

Though there is great potential for using bivalve resources, it could not be exploited, as there was hardly any management plan for this untill 1989. Since 1990, the commune authorities decided to lease for the village an area of 10 ha of coastal land of alluvial plain that was suitable for clam culture. During the very first year 115 households joined together in a form of cooperative to invest for additional stocking at the site. Due to poor management, however, the harvest was not good in 1992-1993. As a result in 1994 only 55 households remained in the cooperative. The management of the grow-out site was then improved through community approach in which cooperative members were assigned specific responsibilities in selection and stocking of seed, harvesting and marketing. It resulted in much better productivity and economic efficiency. In 1994, the cooperative harvested 240 tons of marketable clam valued VND 156 million from 10ha of coastal land. The net profit was VND 57 million. The lesson learnt was that the community base management of resources could help to increase productivity and economic benefit of aquaculture.

Marine Aquaculture

A Case with Mr. Le Ngoc Khoa, Phu duong commune, Song cau district, Phu yen province.

Mr. Khoa is culturing lobster in cage since 1994 after learning from his friends. Before his family was poor and faced serious economic difficulties. With assistance of the friends, he was encouraged to construct two cages of 30 m3 each and stocked 3,600 lobster fry. After 8 months of culture he harvested more than two tons of marketable lobster valued about VND 82.08 million. The net profit was VND 37.98 million. With this profit he could recover all expenses and had enough money to run the next culture cycle without borrowing from bank or friends.

Status of Present Aquaculture Production Including Systems and Practices

Production

Up to 1998 Vietnam has taken into use 626,330 ha water surface for aquaculture of which 335,890 ha is for freshwater farming, 290,000 ha for brackish water shrimp and fish farming. There are 2,600 cages involved in sea farming, while 16,000 cages are in use in the freshwater resources.

Total production from aquaculture in 1998 was 537,870 tons of which 359,000 tons came from freshwater aquaculture and 178,870 tons from brackish and marine aquaculture.

The export value was USD 472 million and 550,000 people was employed

Aquaculture Species and Technology

Integrated Farming System in Freshwater (VAC)

The case studies carried out in the Red River delta provinces have indicated that nearly 15% of households are considering aquaculture as the main occupation and other 17% are considering aquaculture as a secondary occupation. In the Mekong River delta, approximately 80% of farm households have their own small homestead family ponds or garden canal that they can use for Aquaculture (Sinh 1995- refer from WES program).

Integrated farming systems under Vietnamese acronym "VAC" are combining three components of household farming. These are vegetable or fruit tree garden (Vuon), fish /shrimp pond (Ao) and livestock pen (chuong). VAC is a popular farming practice in Vietnam. Although the area of the systems are rather limited compared to agriculture land, these systems indeed are highly intensive production units, which can provide about 30-70% of the household income. The small pond in these systems usually is used for growing aquatic plant for feeding animals including pigs, for fish culture to produce fish protein for family consumption and surplus for cash income. Additionally, the water in the pond is also used for irrigation of the garden and cleaning the livestock pen while the bottom mud is used as quality manure for garden.

The VAC-systems can be very diverse depending on the agro-ecological conditions. Presently the integrated systems are categorized as: garden, fish pond and livestock pen (VAC), garden and fish pond (VA), garden, fish pond, livestock and forestry (VACR), shrimp and mangrove (AR) and fish pond and livestock (AC). The categorized systems are summarized in table 1.

Table 1. Description of integrated farming systems

Systems	Kind of plans	Fish species	Animals	Practiced regions
VAC (garden/pond/ livestock pen)	Fruit trees or ornamental trees; Seasonal vegetables	Carp species (Chinese and Indian carps), tilapias	Pigs and buffalos; chickens/ ducks	Northern Vietnam
VA (garden/pond)	Fruit trees; or Ornamental trees; or Seasonal vegetables	Carp species (Chinese and Indian carps), tilapias, silver bab		Northern and Southern Vietnam
AC (pond/ livestock pen)		Carp species (Chinese and Indian carps), tilapias, silver bab	Pigs and buffalos; chickens/ ducks	Northern Vietnam
VACR (garden/pond/ livestock pen/ forestry)	Fruit trees and forestry	Carp species (Chinese and Indian carps), tilapias	Pigs and buffalos; chickens/ ducks	Northern mountain regions
AR (pond/mangrove)	Mangrove forestry	Shrimp/crab		South Vietnam

Rice/ Fish Culture in Freshwater

A recent survey of the WES-project (1997) indicated that in the Mekong delta region about 90.1% households out of 262 households were involved in rice-fish culture. The

rice-cum-freshwater prawn is also practiced in many provinces in these regions. In many cases, freshwater prawn is stocked with carp species such as common carp, silver carp and silver barbs.

Usually, flood plains are used for rice fish culture rotation while irrigated paddy fields are used for rice cum fish. Paddies are also used for nursing fry and fingerlings of carp/tilapia species. In fact, culture types are very diverse and greatly vary from area to area depending on the ecological conditions. In Mekong delta along the coastline, where paddies are strongly influenced by extrusion of seawater during the dry season, the farmers are practicing shrimp (*Penaeus monodon*) or freshwater prawn (*Macrobrachium resonbergii*) cropping with rice. In inland areas particularly in flood plains, the farmers are using paddies for rice crop and other times during the year - for collecting and feeding wild "black" fish (snakehead and catfish). Stocking of carps and other species in paddies are widely practiced in the rest of Mekong delta. While in the northern and Red River delta, the fish cum rice or rotation with rice are more popular. Practice of fish cum rice or rotation with rice is also found in sewage wet land area.

Cage Culture in Freshwater

Small-scale cage culture in reservoirs or rivers is practiced widely throughout the country. In the north, small bamboo cages (2-6 m^3) are popularly used for grass carp, while in south, wooden cages are used for sand gobi and snake-head. An average production of cage is about 30-40 kg/m^3.

According to an estimate of the Extension unit, Ministry of Fisheries, in 1998 there were 16,000 cages of all sizes. Although, no detailed information is available on the number of cages involved in freshwater fish culture in the north, it is noted that most of the cages concentrate along Lo river, Tuyen quang; Red river (150 cages) in Dan phuong, Ha tay; Son la stream (169 cages) (Ha 1998; Suc 2000). The cages in reservoirs seem to be limited due to poor discharge of water and disease infection.

In southern Vietnam, cage culture activities are concentrated in some reservoirs such as Thac mo, Tri an also along Mekong river branches. In An giang and Dong thap, the farmers practice highly intensive commercial cage culture of catfish (*Pangasius sutchi*) or tilapias (*Oreochromis niloticus*). Both volume and production from cages in these regions exceed small-scale sizes and often reach a thousand cubic meters (m^3) with several hundred tons of production per cage unit. An annual production of pangasius alone from An Giang province ranges from 15-25,000 tons depending upon seed availability and market demand. Sand gobi and snake-heads are mainly cultured in Tri an and other reservoirs in much smaller size. There were several hundred cages for the culture of these fish species in the last few years, however the number of cages is now very much reduced due to outbreak of diseases.

Culture of other Aquatic Animals in Freshwater (soft-shell turtle)

The information available from the extension unit of the Department of Fishery Management, Ministry of Fisheries indicates that the number of the households farming with soft-shell turtle increased from 300 in 1993 to 6,000 in 1997 covering 46 provinces through out the country. Annually 30-50 tons of marketable turtle and 20,000-30,000 hatchlings are produced for international and domestic markets (Trac 1998).

Enhancement of Fisheries in Man-made and Natural Water Bodies

Most of the reservoirs in Vietnam were constructed after 1954 for various purposes such as irrigation, hydro-electricity, flood control and water use for domestic consumption and industry. There are a total about 4,000 reservoirs[1] (Hoi 1999) of which 460 are of medium and large size, each with a water volume around a million cubic meter (Trong 1994).

Although, data on fish yields of the reservoir systems in Vietnam is not accurately available, records in some main reservoirs are made. This shows a downward trend of fish yields in all the recorded reservoirs. Hao, Am and Nghi (1993) estimated that the average landing in 1993 in most of the studied reservoirs was 4.5 times lower than the catch level just after the reservoir construction. This has been attributed to considerable reduction in stocking number of fingerlings.

In small size reservoirs, the adjoining households use it as a pond for extensive or semi-intensive culture of fish.

Shrimp Culture in Brackish Water

There is a high demand for shrimp production in Vietnam mainly due to its potential for export earning and employment opportunities for coastal people. Extensive shrimp farming has been traditionally practiced since the beginning of the century, especially in large lagoons and embanked tidal flats. The 'improved' extensive farming practices seen today has been started since the late 1980s as a result of new economic policies of the Government explicitly encouraging the development of coastal shrimp farming. The Government, and particularly the provincial authorities, made various plans to exploit coastal areas to construct ponds for shrimp culture. About 260,000 ha (1997 estimates) of ponds are currently utilized for coastal aquaculture in Vietnam. Various shrimp species (*P. monodon, P. merguensis*, etc.) contribute the bulk of production.

The Government is planning to further develop shrimp culture, with focus on semi-intensive technology in order to reduce use of land resource and mitigate negative environmental impacts to ensure an environmentally sustainable aquaculture development in the coastal areas.

Presently, shrimp is cultured through many diverse systems. In Mekong delta, besides extensive system with annual yield of 100-200 kg/ha and improved extensive system with annual yield of 200-300 kg/ha, shrimp is also cultured with mud crab (*Scylla serrata*) in polyculture form (in Mekong river delta) or in rotation form (in the central and northern Vietnam). The farmers also practice shrimp in polyculture with seaweed (*Gracilaria* sp.) or rotation with tilapia (*Oreochromis niloticus*), or sea bass (*Lates calcarifer*).

In some provinces (Bac Lieu, Khanh Hoa, Ca Mau, etc.) semi-intensive systems achieve an annual yield of 1,000 –2,500 kg/ha. Semi-intensive system requires high investment for development of infrastructure and for seed and feeds. To operate this system, there is also a need of trained people and good extension services.

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[1] This does not include those constructed/funded by the private sector.

Scale of the shrimp culture is also very diverse. In central and south Vietnam, very few joined venture companies are operating commercial scale farms with some hundred hectares of land. Most of shrimp farms are of household scale due to limitation of land use. Although there is not much information available, an average size shrimp farm ranges from 0.5-2 ha to 5-6 ha. In some regions in the north (Hai Phong) each household is occupying an area of less than one hectare for shrimp culture, in other regions groups of few farmers are given leases for use of lagoons up to hundreds hectares for extensive shrimp culture purposes.

Rice-shrimp Rotation in Brackish Water

Rice-shrimp rotation system is prevalent in the seawater intrusion paddies along coastal lines in Mekong river delta provinces namely Ca Mau, Tra Vinh, Ben Tre. The shrimp is cultured in dry season when seawater intrudes into the rice fields. Without high inputs and special care, yield of shrimp from this system is ranging within 200-300 kg/ha; however, this is considered as a sizeable contribution to the household income.

Seaweed Culture in Brackish Water

Seaweed is cultured in northern provinces such as Hai Phong, Quang Ninh, Nam Dinh Thanh Hoa and in the central province such as Thua thien Hue. Although there are a number of seaweed species available, *Gracillaria sp.* remains the major cultured species in the country. There is very limited information available about seaweed culture. It is estimated that about 2,000 tons of dry product is produced throughout the country. Attempts are being made to introduce a new seaweed species namely *Kappaphycus alvarezii* into farming in Vietnam. This species has been brought to southern central and northern Vietnam for trials. Certain levels of success have been recorded from trials in central Vietnam (Lam 1998). Presently, this species is cultured in 150-200 ha in all parts of the coastal lines (Trac 1998).

Mollusc Culture in Brackish Water

Mollusc species for aquaculture are oyster, pearl oysters, clam, blood cockles, arkshell, scallop and abalone. Pearl oyster species are cultured in Ha Long bay, Khanh Hoa and at Phu Quoc islands. Clams (*Meretrix* sp.) are the major cultured species in the Red River estuary provinces Thai binh and Nam dinh, and in Mekong and Dong Nai estuary provinces such as Tien Giang, Ben Tre. Clams are mainly cultured using wild seed to stock in tidal areas along coastlines and estuaries. Total area for bivalve culture is about 100,000 ha throughout the country (Trac 1998). Currently in Nam Dinh province alone, there are 1,000 ha used for clam culture from which more than 6,000 tons is harvested. Total production of clam is more than 110,000 tons of which in Red River delta contributes 10,000 to 15,000 tons and Mekong delta about 100,000 tons. Blood cockle production is reaching about 10,000 tons in Kien giang province, while scallop is collected in Binh Thuan province annually to the extent of 8,000-12,000 tons.

Other mollusc species such as abalone, sea snails are caught from wild and maintained in cages or tanks for fattening.

Crab Culture in Brackish Water

Although, there is not special crab culture area, it is an important species among the cultured species in the brackish water environment. The seed of crab is mainly collected from the wild from estuaries and mangroves. The crab seeds are stocked in rotation with other species such as shrimp or fish during winter period. Although, no detailed information is available on crab production and culture areas, some sources indicate that it is cultured widely throughout the country. In the north it is cultured in Quang ninh, Hai phong, Nam dinh provinces; in central- Thanh hoa, Nghe an, Thua thien Hue and in Mekong delta in Ca mau, Kien giang etc.

Fish Cage Culture in Marine Waters

Cage culture is newly introduced in aquaculture practice. However, at this stage, cages are used mainly for live storing or fattening of caught snappers, groupers and other marine species for both export and domestic markets. It is estimated that total finfish production from marine cage culture is about 5,000 tons annually (2,600 cages). Although, there is great expectation (200,000 tons by year 2010) to cage culture of marine species, inadequate amount of seed production and supply due to lack of efficient hatchery technology remains a serious bottleneck. Technical gaps in the grow-out technologies including cage engineering, feeds and feeding constraint rapid development of mariculture of finfish.

Cage Culture of Spiny Lobster in Marine Waters

The seed is collected from the wild and stocked in cages installed along the coast. Lobster culture is practiced in many provinces especially Khanh Hoa (Van Ninh, Cam Ranh, Ninh Hoa), Binh Dinh, Phu Yen, Quang Ngai, Thua Thien Hue. However it is concentrated in Khanh Hoa where about 580 cages are operated involving about 1012 labors and achieve an annual production of about 64.0 tons (1996). The review of Luong (1998) on lobster culture in Van Ninh district indicates that about 90% of the households dealing with lobster culture have been able to gain a marginal profit. The production of lobster from this district significantly increased from 0.4 tons in 1992 to 64 tons in 1996.

Other Fish Species

An important point is to be noted that though the contribution of Chinese carp has been reduced since Indian major carps were introduced in aquaculture practices at the beginning eighties, the share of these species still ranges from 30-60% depending on the geographical regions. Contribution of silver barb and tilapia is expected to increase in near future. The indigenous fish species are also introduced in aquaculture such as snakehead, barbs, riverine catfish, etc.

Infrastructure and Technical Capacities for Aquaculture

Up to now there are 354 freshwater fish hatcheries producing 500 million fry/year (equal to 7 billion fish larvae) and 3,000 hatcheries for production of shrimps. The shrimp seed production is over 4 billion fry (PL_{15}) most of which are tiger prawn.

There are 27 feed mills operating with an annual production of 45,000 tons mainly used for shrimps and snakehead fish.

Three vocational schools (fisheries high schools no.1 Hai Phong, no.3 Ho Chi Minh, no.4 Bac Ninh), six universities (Agricultural University, Vinh Teacher University, Hue Agricultural University, Fisheries University in Nha Trang, Forestry and

agriculture University in Ho Chi Minh, Can Tho University) and four research and development institutes (RIA No.1, 2 and 3 and RIMP) are related to capacity building in the aquaculture sector.

Administration and Policy

There are two departments involved in aquaculture administration, policy development and extension in the Ministry of Fisheries: Fisheries Dept. (including extension) and Dept. of Science and Technology (revising policies, mechanism management and instructing of localities). The administration and policy responsibility covers: technology policy, policy of land use, seed, micro-credits and management systems for Government to Local Government as well as development of strategies.

The Natural Resource Potential for Aquaculture Development

Climatic Conditions

As a tropical country the conditions are suitable for farming of many aquatic species.

In the northern part:	
Average temperature	22.5-23.5 ^{0}C
Average rainfall	1,500-2,400 mm/year
Total sunshine hours	1,650-1,750 h/year
Tidal range	3.2-3.6m
In the central part:	
Average temperature	25.5-27.5 ^{0}C
Average rainfall	1,500-2,000 mm/year
Total sunshine hours	2,300-3,000 h/year
In the southern part:	
Average temperature	22.6-27.6 ^{0}C
Average rainfall	1,400-2,400 mm/year
Total sunshine hours	2,000 h/year

Area Resources

Vietnam has large potentials for aquaculture development. There are an estimated 1.7 million hectares of water surface suitable for aquaculture purposes when including freshwater, brackish and marine water resources. This estimate is based on the following resource distribution:

Ponds and small reservoirs	120,000 ha
Large reservoirs and lakes	340,000 ha
Paddy-land	580,000 ha
Tidal brackish water	660,000 ha
Potential bays, lagoons about	400,000 ha
Total	1,700,000 ha

The water surface areas are distributed throughout all parts of the country.

Conclusion and Recommendation

Through the combination of suitable aquatic resources, manpower and human capacity a.o. at the research institutes and with the support from international agencies and donors Vietnam is seeking to speed up the process of implementing the Aquaculture Development Program for the period 2000-2010, however to develop aquaculture many further constraints have to be addressed, such as:

- Institutional capacity building for central management and implementation at local level (extension) has to be strengthened.
- Develop regional and detailed district development plans.
- Improve and build capacity for seed production systems in all regions through pilot facilities
- Work out policies on land and water surface utilization.
- Building capacity for research and training systems.
- Develop subsidiary policies vis a'vis seed price, and risk reduction.
- Find/develop credit arrangements for development and investments.
- Assistance policies for farmers and fishermen in areas needed for structure reforms such as inshore exploitation areas, opium farming areas, low-lying paddy fields, poor, remote and isolated areas etc.

For appropriate utilization of natural and human resources Vietnam is seeking to develop aquaculture following the objectives of the Aquaculture Development Program (2000-2010), which was approved by the Government according to the decision 224/1999/QD-TTg dated 8th December 1999 ensuring food security, job creation, income generation, provision of material for export processing thus contributing to hunger eradication and poverty alleviation.

In addition to self-reliance of the Vietnamese Government and people in the fisheries sector, we hope to be supported by international organizations and other countries, as well as international donors in a more powerful and concrete way.

Report on Technical Assistance for Aquaculture Related to Poverty Alleviation

By
Dr. Vu Van Trieu
International Cooperation Department,
Ministry of Fisheries

Background and Justification

Poverty alleviation through the development of aquaculture is one of the effective measures recognized by the Government of Vietnam for quite long time, especially since the introduction of " Doi moi policy" in 1986, aquaculture has played an increasingly important role for poverty alleviation in particular and for rural development in general.

Aiming at sustainable development of aquaculture, the Government of Vietnam has invested in aquaculture through program 773 which in parallel to technical assistance from bilateral and international donors, as well as from NGOs, has contributed to human resources development and transfer of appropriate technologies and poverty alleviation in Vietnam.

A preliminary list of technical assistance projects was attached to this paper. An updated list based on contributions from all participants is given in *Annex 6*.

Program 327 and 773 of the Government

The Program 327 was approved on the 15th September 1992 by the Chairman of the Ministerial Council, supporting the utilization of poor soil, forests, coastal alluvial and water surface in delta areas, including aquaculture, forestry and agriculture.

The Program 773 TTg was approved on the 21st December, 1994 by the Primary Minister of the Government, focusing on aquaculture, for exploiting, and utilizing fallow, coastal alluvial and water surfaces in delta areas.

From 1991 to 2000, 101 projects on fisheries and aquaculture have been approved, with a total budget of VND 1,130,088 million (equivalent to USD 90 million): in which there is VND 485,565 million from the State budget, VND 141,921 million from the loan and VND 213,202 million from other sources.

There have been 81 projects which have been implemented with a total budget of VND 670,850 million (equivalent to USD 50 million): in which there is VND 317,470 million from the State budget, VND 89,056 million from loans, VND 170,500 million from mobilizing of capital and VND 93,824 million from other capital.

The program has put 64,442 ha of aquaculture into place creating jobs for 126,621 people, making an active contribution to poverty alleviation.

Projects and Technical Assistance Funded by Overseas Donors

An updated list of donor projects can be in *Annex 9* List of International Donor Supported Projects in Fisheries and Aquaculture in Vietnam.

Conclusion and Recommendations

From the report " Status of aquaculture in Vietnam" and other documentation, we all know that the productivity of aquaculture in Vietnam remains low compared to other countries in the region, and large areas suitable for aquaculture have not yet been exploited. Potential exists to increase the contribution to rural development and poverty alleviation. Because of that, support to sustainable aquaculture from bilateral donors, international donors and NGOs is required with the following objectives:

- Enhanced capacities of poor people in rural areas to improve livelihoods through aquaculture and aquatic resources management.
- Strengthened capabilities of institutions to support poverty alleviation in inland upland and coastal communities through sustainable development of aquaculture.
- Development of environmentally sound, low-cost aquaculture technologies and management practices for aquaculture and better aquatic resources management.
- Promotion of collaboration in information exchange and awareness building of the roles of aquaculture and aquatic resources management in poverty alleviation in Vietnam.

Report on Women's Role in Aquaculture

By
Mdm Nguyen Thi Vang
Women's Union,
Gia Loc

Long ago, there was a famous Vietnamese proverb: " If you want to possess farming land you must have buffalo and if you want to be rich you should rear fish".

Rearing fish bring very high economic benefits. But who takes care of the fisheries activities? And what is the role of women in aquaculture in Gia Loc? I would like to report on the Gia Loc women's role in aquaculture.

In 1996, the Women's Union in Gia Loc received support from Research Institute for Aquaculture No. 1 under an aquaculture project, VIE 93/001, executed by the Food Agriculture Organization (FAO) and funded by the United Nations Development Program (UNDP). The project has the objective of introducing techniques of fresh water fish rearing to women in rural areas.

Gia Loc is a district of Hai Duong province with 12,346.71 ha of natural land, and cultivated land of 7,438 ha. It has a rather dense population with about 147,274 people living in 36,798 households. It has 127 communes (villages). The total number of laborers is 74,487 of which nearly 44,000 are women. Its water surface covered 960 ha. Before 1995, people in Gia Loc started rearing fish, but in a simple way with low stocking density and extensive culture methods. The feeding method was very casual. As result, average productivity only reached 54 kg/sao[1]. The land yielded 2.51 crops/year in 1995 (in 1996 to now it yields 2.67 times/year). The number of unemployed people and those making a living far from their homes was very high.

Women in Gia Loc have to shoulder housework as well as care for their children and other family members. Therefore, women's health is a major concern. About 40% of pregnant women and children below 5 years old suffer from malnutrition.

There were about 4,000 households, which had ponds, but few were rearing fish. In order to address this problem, in January 1996, the Gia Loc Communist Party decreed "Resolution 1" on renovation of gardens and ponds to high economic value ones.

Following the Resolution, fish culture started to develop and became popular in Gia Loc. Since years ago, people think that fish culture activities are only for men not for women. Therefore women have to do their farm work in the field from early dawn till late evening under control of their husbands. They also have to cut grass to feed fish. The average pond productivity is still low due to lack of fish culture techniques. It indicates that their labor is wasteful. Sometimes, fish disease occurs and fish farmers do not know reasons. Many households have had to throw away 100 kg of dead fish due to over-fertilization with chicken dung, or due to an overdose of sulphate during disease control.

[1] 1 sao = 360 m^2

Due to lack of knowledge about aquaculture, women's role is still very low appreciated and equality to their husbands in the family cannot be accepted. As a result, men decide all plans for aquaculture. That is one of the issues not only concerned by Women Union in Gia Loc but also by Vietnamese Women Union with its operation in 5 local programs and 2 movements. Of which Program 1 is to improve knowledge and profession for women and women's movement on studying, working creatively as well as well bringing up children and caring for their family. Improving knowledge only centers on rice cultivation and fruit tree planting. Fish culture technique is still not paid much attention.

Fortunately, in June 1996 thanks to Research Institute for Aquaculture No. 1, the Gia Loc Women's Union received project VIE/93-001, supported by FAO & UNDP. The objective of the project was to improve knowledge of fish culture technology in freshwater for women in rural areas. The process of receiving the project followed four steps:

- Step 1: Select representatives from 5 communes with large number of fishponds and potential for aquaculture to a steering committee.
- Step 2: Implement fisheries extension course for 33 trainers from Gia Loc Women's Union and 9 communes.
- Step 3: Implement 4 courses for 120 trainees from 9 communes to ensure all of the communes get fish culture techniques.
- Step 4: Gia Loc Women Union invests money for continuing 13 aquaculture courses for 1,759 women. In 1998, 11 courses were organized for 635; and in 1999 14 courses for 980 women. In the first quarter of 2000 a total number of 10 courses were organized for 776 women.

As result of the above activities, all 25 communes of Gia Loc district, 4,134 women were introduced to techniques for freshwater fish culture. Investigations were carried out in households before and after these training courses. Productivity rises remarkably at 120-150 kg/sao, even some reach 170-200 kg/sao. Many households become pilot models for others. Up to now, there are 7,000 households taking part in fish culture movement with nearly 8,000 laborers. In 1996, fish production was only 600 tons but in 1998 and 1999 it was 1,600 tons and 2,114 tons respectively. Most important, women already received knowledge of fish culture and knew how to apply this knowledge to their work in reality. They can say and do what they said contributing much to fish production. They are more respected by their husbands and their children and become more equal to men. Women's position is being raised so they can decide to plan their work. They can make quantitative feed, make disease protection for fish, find breeding selection and plan fish harvest time. Many women now can stand firmly on their feet to make up their mind on fields of pond basic construction and harvesting, selling fish. Besides being equipped with knowledge, women established an organization for providing loan to rear fish. Therefore, the role of women in the family is becoming more stable and respected.

Through investigations in fish culture households, there are 2,456 households recognized as well managed farms at 3 levels (commune, district and province) and

poverty situation does not exist. 1,197 households of the above number realize that women play a key role in the family. It indicates that while possessing knowledge and capital women are holders in aquaculture activities. So the perception of fish culture only for men has been terminated.

However, fish culture in Gia Loc has not reached an effective level. This is because only 50% of households involved in aquaculture have been trained. Pond construction and drainage systems are not good, influencing the success of fish culture. On the other hand, there is no effective water drainage system, affecting water sources, environment and women's health. Therefore, on behalf of Gia Loc Women's Union I would like to give some proposals to The Ministry of Fisheries and Research Institute for Aquaculture I as follows:

- Continue putting other projects in Gia Loc in order to improve knowledge for women in the rural area, with the objective of training 80-100% of fish farmers. This is a long-term and sustainable method to develop fisheries and building advanced capacity for improving women's role in the rural area.

- Invest in processing projects.

- Provide loans with priority interest for fish farmers.

Health Management and Risk Reduction in Small-Scale Aquaculture

By
Dr. Rohana P. Subasinghe
Inland Water Resources and Aquaculture Service
FIRI, FAO, Viale delle Terme di Caracalla,
Rome

Rural and small-scale aquaculture significantly contributes to the global production of freshwater and marine fish and penaeid shrimp. There is evidence that a good percentage of disease losses in aquaculture occur in the rural, small-scale sector. Epizootic Ulcerative Syndrome (EUS) of fresh and brackish water fish, White Spot Disease (WSD) of penaeid shrimp, and Red Spot Disease of Grass Carp are some examples from Asia. Recent information from the Philippines and Thailand suggest that small-scale grouper culture do experience significant reduction in income due to health and disease problems. Such losses and reduction in income significantly affect the livelihoods of poor households who depend on rural, small-scale aquaculture.

Rural, small-scale farmers are generally resource-poor, have little or no knowledge of health management and limited access to aquatic animal health services. As a result, their ability to effectively respond to disease outbreaks and health related problems is limited. Any intervention towards assisting rural, small-scale sector should be carefully thought and must be based on an understanding and knowledge of how the sector is managed, both by the farmers themselves and the others involved. Interventions must be practical, community-based, scientifically sound, socially acceptable and appropriate to the needs of small-scale farmers. The emphasis should be on preventative health care of aquatic animals and maintaining a healthy environment that reduce the risks of disease outbreaks or production losses, and promotes healthy production systems. The focus should also be on people and populations, and not narrowly limited to pathogens and technology.

The question is how to incorporate health management interventions to a multidisciplinary program such as Sustainable Aquaculture for Poverty Alleviation (SAPA) launched by the Government of Vietnam. Firstly, interventions to understand existing management strategies by the small-scale farmers should be included within the livelihoods analysis methodologies aimed at understanding overall livelihoods of rural communities. Once existing management strategies and the capacities of farmers are understood, development of suitable and effective interventions for monitoring and managing the health of these systems at the farm level becomes relatively less complicated and attainable. There is an urgent need to institute essential changes that will stir away from the conventional top down health management approaches generally practiced in aquaculture to a more bottom up approach for addressing the rural, small-scale aquaculture sector. This is the real challenge for addressing health management issues within the umbrella of SAPA.

Small-scale Aquaculture in the Red River Delta

By
Dr. Harvey Demaine
Aquaculture and Aquatic Resources Management, AIT, Bangkok
and
Dr. Le Thanh Luu
Research institute for aquaculture No1
Dinh Bang, Tien Son Bac Ninh
Phone: 84-4-8271368 Fax: 84-4-8273070

Introduction

The Red River delta is one of the most densely populated areas in the world. The average population density is about 1,000 persons/km^2, rising to over 1,200 persons/km^2 in provinces like Bac Ninh and Thai Binh. Around 80% of the population in the delta makes their living from agriculture activities, so that the limitation of arable land is seen as the main constraint to improvement of the livelihood of the population. The average household has a total holding area of only 0.3 ha, so that even with rice yields averaging 5-6 tones per hectare per crop per year, on the basis of double cropping, rice production per household averages only 3.6 tones, offering gross returns of only around VND 4 million. It is apparent that the rice economy cannot offer an adequate livelihood and livelihood has long depended upon the production from the home garden.[1]

President Ho Chi Minh encouraged home garden development at the height of the American war to encourage self-sufficiency amongst rural households. Ho promoted the integration of agriculture and aquaculture through the development of small farm ponds in a system, which has come to be known as VAC from the Vietnamese words for orchard, pond and pigsty.[2] Although it has proved difficult to develop such a model in the extremely densely populated areas in parts of the delta, where in traditional villages houses are packed extremely closely together, it is estimated that as many as 40% of rural households in the Red River delta have the core of such a system, if not all elements.

The AIT Aqua Outreach Program in the Red River Delta

In 1994, the Asian Institute of Technology's Aqua Outreach program (AOP) and the Research Institute for Aquaculture No.1 (RIA1) began to collaborate in an effort to develop small-scale aquaculture in the Red River delta. Development of the VAC systems was an obvious focus of this collaboration. In the dialogue between the two institutes, RIA1 scientists pointed to the potentials of the VAC system for the improvement of rural livelihoods in the delta, but expressed concern that the system was beginning to break down as a result of pressures towards intensification of agriculture, even on the part of the quasi-non-governmental organization, VACVINA, which was promoting specialist enterprises such as rearing of frogs and soft-shelled

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[1] This was true even before the privatization of land holdings in 1987. Even when the communes operated rice land individual households were able to cultivate their own gardens, known as the 10% plots, which offered the bulk of household income.

[2] Vuon-Ao-Chuong

turtles. The research partners felt that there was scope for improvement of the system while at the same time maintaining its integrity as an integrated, low-external input system.

However, initial field reconnaissance of the VAC systems revealed that these were extremely complex and that the scope for development depended upon both the wider agricultural system and on market opportunities. The AIT-RIA1 team therefore determined the need for a broad-spectrum household level survey of the VAC systems in different agro-ecologies and agro-economic contexts in the delta. A total of 240 households from 8 communes representative of different zones was undertaken in 1995 and was followed by a more detailed examination of the flows of inputs and outputs in some 40 selected households. Somewhat surprisingly these studies revealed that the aquaculture component of VAC was relatively underdeveloped. Only 15% of households considered aquaculture to be their main occupation, with another 18% ranked it as the main supplementary occupation. Many households were not aware of improved practices in fish culture and yields averaged ranged from 1.7 tons/ha to 3.3 tons/ha according to the agro-ecological zone. The AIT-RIA1 team identified a range of improvements in aquaculture itself that could be introduced without any attempt to shift resources from one part of the system to other.

In 1996 the Project began a process of on-farm research with 40 households in the eight selected communes. Recommendations were farm-specific, but included (a) improvement of the pond environment, through deepening, removing mud and application of lime and manure; (b) stocking of larger fingerlings; (c) use of inorganic fertilizers to supplement manures; (d) supplementary feeding; and (e) a multiple stocking and harvesting strategy. Staff of the newly established socio-economic studies unit in RIA1 visited farmers on a regular basis to advise and guide the trials, but the only subsidized inputs were improved seed from the Institute itself. Farmers recorded their inputs and outputs in a record book supplied by the Project and, at the end of season, rather formal meetings were held at RIA1 to compare costs, returns and experience. The number of on-farm trials was expanded in 1997 and 1998 so that provinces not originally included were also introduced to the approach.

It should be noted here that the selection of farmers for the trials was not based exclusively on poverty criteria. The Project was often under pressure from commune leaders to include certain farmers in the trials and it was itself interested to observe the relative appropriateness of the recommendations to farmers of different socio-economic status. It should also be noted that the sample communes included two in the suburbs of Hanoi city, which were seen as having very specific potentials, including the possibility of using urban and industrial by-products.

Later, from 1997 onwards, the project began to widen its systems focus to explore the possibility of rice-fish culture, based around common carp, and cage culture of tilapia in reservoirs. Rotational rice-fish culture was a traditional practice in the Red River delta, especially in the lower-lying areas where flood levels in the rainy season prevented rice cultivation or made for low yields. In fact, the land use pattern in such areas was known as 'one rice-one fish' even though during the period of communal agriculture, double-crop rice was attempted. With the emergence of the new land code in the early 1990s, many of these extensive low-lying lands were offered for rent to better-off farmers, who often saw the possibilities of returning to fish culture. Mindful

that these were indeed the richer farmers, the RIA1–AIT project sought rather to test both the rotational mode and the concurrent mode of rice-fish culture. A modest number of trials have been implemented mainly in Bac Ninh and Nam Dinh provinces.

Results of the Trials

The VAC trials have demonstrated clearly that it is possible to bring about significant improvements in the productivity of the aquaculture component of the system. Although yields in the first year of trials were only slightly above the original levels, as farmer confidence grew, willingness to invest increased and in the 1997 season, trialists achieved an average yield of 4.5 tons/ha. In general, the technical recommendations have proved as accessible to the poorer farmers as much as the better off. It has not been necessary to move to specific recommendations to shift resources from other parts of the system. Once it has been demonstrated that fish can be reared successfully with good profit, farmers have themselves made alterations to their systems. Ponds largely used for growing macrophytes for pig feed have been converted to fish culture and the pig feed supplied from terrestrial plants. Overall pond inputs have increased dramatically and, where space has allowed, pond area has been increased.

After two years of trials, however, a number of constraints began to emerge. At the start of the trials, the dominant aquaculture system was a grass carp-based polyculture, usually including silver carp and Indian carps, especially rohu, in the more intensive zone where greater amounts of pig manure were available. It appears that there are limits to the intensification of this system, with farmers experiencing water quality problems from overloading of vegetation and the spread of red-spot disease. Since 1998, therefore, a second round of trials has been introduced, based upon improved strains of tilapia introduced from Thailand, with a shift from feed to fertilization as the key element in the strategy. Tilapia faces constraints in northern Vietnam because the cold winters constrain the early season production of fry. Efforts have therefore been made to over winter broodstock and fry and to produce early season fry from areas of warm water from geothermal sources. On the basis of this adaptive research, it should now be possible to make tilapia available early in the season.

Trials in rice fish culture have also proved reasonably successful, with fish yields of between 700-1,100 kg/ha being added to single crop rice production in the rotational culture, with an increased value of some VND 6 million. However, there are perceived to be problems in water control in this system, which probably requires higher dikes, which are beyond the financial capacity of individual farmers. Rearing of tilapia fry in paddy fields has also been identified as one of the strategies to overcome the early season seed shortages.

Institutional Issues

Three years of trials have established a technology package. The issue has now become how to disseminate the proven technical recommendations to a wider range of farmers. Although RIA1 states that its mandate includes 'extension' and although it established a 'transfer of technology network' under successive UNDP-funded projects, this network has not proved sustainable without external support and

extension is not naturally the role of the Institute. The goal of the AIT-RIA1 project of co-operation as it enters its third phase is to transfer the responsibility for conduct of on-farm trials and the dissemination of their positive results to the provinces. In 1999, RIA1 began to enter into contracts with certain provinces in the Red River delta whereby the responsibilities for further implementation would be handed over. Some provinces such as Bac Ninh, Hai Duong and Ninh Binh have successfully implemented a further round of trials in new districts and communes, but others were not able to allocate manpower to such efforts.

The project had hoped also to institute a system whereby the provinces move into 'extension mode' in those districts where on-farm trials had previously been carried out, disseminating the experience of the trialists to other groups through farm visits, training and distribution of extension materials. Some farmer visits were implemented in 1999, but a sustainable 'extension' system has yet to be developed. It is clear that broad front dissemination of the technical recommendations cannot be achieved through either the 'demonstration effect' of a limited number of trialists or by training of farmers by RIA1 staff. Capacity must be build up at provincial level, with RIA1 backstopping through the monitoring of impact and offering advice on the preparation of training and extension materials.

Capacity Building

Since 1994 the co-operation between AIT and RIA1 has involved a process of capacity building, whereby RIA1 staff have adopted a fairly traditional 'farming systems approach' to small-scale aquaculture development. This has involved analysis of the role of aquaculture in existing agricultural systems through conventional socio-economic surveys, data processing by the Institute largely centered around calculation of costs and returns of the aquaculture enterprises and the first steps in the transfer of this approach to provincial departments of agriculture and rural development. Alongside this the project has supported efforts at preparation of provincial level aquatic resource development plans, although the methodologies involved have also remained rather conventional 'target setting.'

While the introduction of these approaches to an aquatic resources research institute is a significant achievement, overall this process has become rather mechanical and driven by the Institute. Capacity building needs to constantly emphasize an understanding of the purpose of trials and the ability to target interventions. To some extent, these trials have tended to lose their real focus on the purpose of adaptation of technology to context, especially the socio-economic context of the rural poor. The 1999 trials in Bac Ninh, Hai Duong and Ninh Binh illustrate the problem of targeting raised earlier. The 30 trialists were already engaged in aquaculture at a fairly intensive level, with average yields prior to Project intervention of 4.3 tones/ha. The 'trials' succeeded in raising those yields to around 4.9 tones, but only with a significant increase in inputs. That farmers appear to have been better off appears to be explained by an increase in the average price of fish obtained.

Without that understanding, there must be questions about the application of such an approach by provincial staff and the sustainability of the still strong role of RIA1 in the process on a wider front.

At the present time, the AIT- RIA1 co-operation, supported by Sida, is moving into its third phase. In this phase, with the encouragement of Sida, AIT is seeking to make the whole process more poverty-focused, more participatory and more based upon the capacity of the provinces. It intends to shift emphasis to the northern mountains and midlands, specifically to the three provinces of Cao Bang, Lang Son and Bac Giang, with some support to Lai Chau and Thai Nguyen. A modest round of trials begun in the two latter provinces since 1998 indicate that it will be considerably more difficult to establish the basic technical package in what are very much 'resource-poorer' environments. A recent review of the experience in Thai Nguyen suggests that the ability of farmers to follow the 'Red River-based' recommendations in the midlands is quite limited. In the remainder of the year 2000, it is intended to hold workshops with provincial authorities and eventually with selected communes to pinpoint needs and problems in the aquatic resources sector and to address these through a strategic plan of activities of which the provinces have ownership. This will present a series of new challenges to our efforts.

Report on Results of Rice Cum Fish Culture in Dien Bien Valley 1999

By
Nguyen Van Vuong
Research institute for aquaculture NoI
Dinh Bang, Tien Son Bac Ninh
Phone: 84-4-8271368 Fax: 84-4-8273070

Objective for the Program

The main objective is adoption of advanced aquaculture science and technology on building sustainable aquaculture models to improve fish production in Dien Bien"

Natural Conditions of Dien Bien

The Dien Bien valley consists of Dien Bien town and Dien Bien district and belongs to Son La province situated in the West-northern region of Vietnam. The topography in Dien Bien characterizes mainly by high sloping mountains, mixes with rice field along valleys of mountains. There is a plain called Muong Thanh in the valley, which is quite large and even. Due to low elevation in Muong Thanh, it is very easy to access water from reservoirs and rivers that are suitable for wet rice cultivation and fish culture. The soil here is also fertile and supports an average rice productivity of 10 tons/ha/year. Though favorable condition for fresh water aquaculture, fish culture in Dien Bien valley is still less developed because farmer's only stock fish without feed and manure application. Therefore rice cum fish culture has high potential, local people did not become involved in this mode of aquaculture. Recognizing the potential of aquaculture and opportunities to improve living standards for local people through income generation, employment, efficient use of natural resources, the project tilted: "Adoption of advanced aquaculture science and technology on building sustainable aquaculture models to improve fish production in Dien Bien" was initiated with the co-operation of the Department of Science and Technology in Lai Chau and Research Institute for Aquaculture NoI and other local authorities.

Opportunities and Constraints of the Project

Opportunities

- Objectives of the project meet farmers' requirement
- There is close collaboration and support from local authorities
- The natural endowment in Dien Bien is suitable for rice cum fish culture.
- Local farmers have step-by-step realized the importance of technological adoption in fish culture and they are ready to try and apply scientific technology into fish production.
- Farmers were provided loans for starting rice cum fish culture.

Constraints

- Though the project was approved in December of 1998, financial allocation was delayed until May of 1999, which caused difficulties in project implementing.
- The fields for rich cum fish culture have not developed yet and supported with poor facilities.

- Farmers have low education attainment with low aquaculture technical know-how
- There is a lack of capital for fish farming.

Activities and Results

Fish Seed

The project has cooperated with the RIA1 and Noong Bua fish cooperative to produce 65,746 fingerlings of different species to supply for demonstration farms in Thanh Minh and Thanh Luong communes with the project area of 5.1 ha and for 44 aqua-households.

Training Aquaculture Technology

The project has organized 8 short training courses for 351 aqua-farmers and are organizing 4 courses of aqua-farm visits for 144 farmers; disseminating aquaculture technology through public media (Telecommunication) with 18 times per six months.

The project staff also directly visited aqua-farms and guided aqua-farmers to build rice cum fish models and stock fish techniques.

Up to 13 July of 1999 there were 12,750 fingerlings stocked, of which 20% where Rohu, 20% common carp and 60% of mono-sex tilapia with stocking density of 2,500 fingerlings/ha. The stocking weight of fingerlings for Rohu, Common carp and tilapia were 10, 10 and 5 grams/fingerling respectively (Table 1).

Table 1: Number of farms and the total area they cover. Number of fingerlings supplied for selected communes

	Number of farms	Area (m^2)	Number of fingerlings			
			Rohu	Common carp	Tilapia	Total
Thanh Minh	10	12,200	610	610	1,830	3,050
Thanh Luong	33	38,800	1,940	1,940	5,820	9,700
Total	43	51,000	2,550	2,550	7,650	12,750

After stocking fingerlings, the project staff regularly visits and support farmers to manage pond such as manuaring, feeding, etc.

Fish was harvested after four months of stocking, with production showed on table 2.

Table 2: Average weight at harvest for selected fish species

	Average weight of fish harvested (kg/fish)				
	Silver carp	Rohu	Grass carp	Common carp	Tilapia
Thanh Minh	0.3	0.1	0.3	0.3	0.1
Thanh Luong	0.33	0.24	0.43	0.28	0.1
Average	0.315	0.17	0.365	0.29	0.1
Monthly growth rate	0.074	0.04	0.048	0.070	0.024
Survival rate	-	80%	-	80%	75%

In table 3 the total production of the farms in the area are given together with the area they cover. The average production from the three farms are 283.25 kg/ha.

Table 3: Total production of demonstration farms in 1999.

	Number of farms	Production (kg)	Area (ha)
Thanh Minh	10	268.8	1.220
Thanh Luong	33	1,175.8	3.880
Total	43	1,444.5	5.100

There was a number of farms with a production above 300 kg/ha namely 5 farms in Thanh Minh and 21 farms in Thanh Loung. The rest of the farms had productions between 200-300 kg/ha

In table 4 the rice production from rice cum fish farms at the demonstration farms are presented.

Table 4: Rice production of rice cum fish demonstration farms in 1998 and 1999

Farm	Area (m^2)	Rice production 1998	Rice production 1999	Rice production in 1999 (kg/ha)
Lo Van Pang	1,000	300	300	3,000
Luong Van Doi	1,000	300	476	4,760
Lo Van Thanh	4,000	1,200	1,400	3,500
Lo Van Lun	1,000	300	330	3,300
Quang Van Tam	1,000	320	350	3,500
Lo Van Pieng	1,000	300	320	3,200
Total	9,000	2,720	3,176	-
Average production kg/ha/crop	-	3,022	3,528	

Total rice production of rice cum fish farms in 1999 gained average 17,952 kg

Economic analysis of 1 ha rice field in 1998 and 1999 is showed in table 5

Table 5: Some economic figures on 1 ha of rice in 1998-1999. (Prizes are in VND)

Year	Items from rice production			Items from fish production			Total value (VND)
	Quantity	Price unit	Value	Quantity	Price unit	Value	
1998	3,022	2,000	6,044,000	0	0	0	6,044,000
1999	3,528	2,000	7,056,000	283.24	15,000	4,248,600	11,304,600

The results from table 5 revealed that the difference of value between 1998 and 1999 was VND 5,260,600. Fingerling cost for two year was 2,150,000 VND/ha. Gross margin from aquaculture was VND 3,110,600.

Conclusions and Recommendations

Conclusions

The results of demonstration farms have met the objectives of the project:

- Fish productivity and production.
- Protection of environment.
- Improving culture technology for aqua-farmers.

Recommendations

- MOSTE should provide financial resource to meet the project requirement.
- The area of rice cum fish culture should be expanded in the year 2000 and increase hybrid common carp.

Rural Extension for Aquaculture Development

By
Nguyen Van Hao
Research Institute for Aquaculture No.2

Background

Fish is the most popular and most important source of animal protein for people living near the in Mekong Delta of Vietnam. Traditionally, abundant supply of freshwater fish was available to farmers from rice fields, wetland, rivers and canals. With the increased population and the increased use of agro-chemicals especially pesticides associated with the spread of intensive agriculture, the supply of fish from traditional sources has diminished. Because of this, farmers and policy makers are looking to aquaculture for alternative supply of fish. Beyond the interest in growing fish to augment the diminishing supply of the household, farmers are interested to grow fish for sale in the local and other domestic markets.

The potential for increasing the aquaculture production is considerable. It is estimated that only 31,000 ha of 95,000 ha of relatively low-lying land in use. In the case of single and double crop rice land relevant for rice-fish culture; about 35,000 ha of the estimated 400,000 ha are currently being utilized for this type of production (CTU 1993). Freshwater aquaculture practices in Mekong Delta of Vietnam are relatively new but the number of farmers involved in the activity has increased rapidly. However, their successes are mixed, as their knowledge in fish culture is limited. For this reason, establishment of an efficient aquaculture extension system to transfer appropriate aquaculture technologies is considered an urgent undertake to facilitate aquaculture development.

The Mekong River Commission with funding support from DANIDA is implementing a project "*Rural Extension for Aquaculture Development in the Mekong Delta of Vietnam and Cambodia*" to promote aquaculture development among small-scale farmers of the Mekong Delta of Vietnam and Cambodia. Research Institute for Aquaculture No. 2 in Vietnam and Department of Fisheries in Cambodia are the national agencies involved in implementation of the project activities. The project Rural Extension for Aquaculture Development in Mekong Delta started its activity in January of 1998 in Vietnam and six months later in Cambodia and will come to an end in June 2001. In the Mekong Delta of Vietnam, the project has selected Tien Giang Province as pilot project area during the first phase of the project, Tien Giang Province was selected based on its diverse agro-ecological zones and socio-economic groups which considered being representative of the Delta.

Objectives

The development objective of the project is "Increased farm income through aquaculture". The immediate objective of the project component in Vietnam is "An efficient aquaculture extension network developed and in operation".

Project Outputs

In brief, the project outputs in Vietnam include:

- Extension strategy developed and tested
- Extension packages for main culture systems tested
- Research and extension institution upgraded.

Project Activities

Baseline Survey of Tien Giang Province in 1998

The project completed baseline survey of Tien Giang province covering 361 households. The resulting report provides details of demographic information, socio-economic status, farming system practices in different agro-ecological zones, financial and economic analysis of different farming systems. The survey indicates that:

- Land use composition consists of 1,756 square kilometer of agricultural area, 230 square kilometer of water surface and a small area of Melaluka forest of less than one square kilometer.

- The population of the province was approximately 1.74 million people in 1997 with an average density of 750 people per square kilometer. Between 1995-1997, 20% of the labor force shifted from agriculture into business and trading resulting in a decline of agricultural labor from 80% to 60% of total labor force. Average gross domestic product per capita of the province has been increased steadily from USD 346 in 1995 to USD 402 in 1997 (Statistical Bureau of Can Tho 1998).

- Primary occupation of household heads: Since rice production was the core economic activity in Tien Giang Province, rice farming was reported to be the main primary occupation among 48.6% of household heads. Next to rice farmers, 20.7% of the respondents identified themselves as fruit tree farmer, 11.2% as aquaculture farmer, 3.4% as livestock farmer, 2.5% as cash crop farmer and only 0.3% as fishermen. Apart from agriculture, the primary non-farm occupations of household heads were local officer (3.6%), teacher (0.3%), small trader (0.6%), and wage labor (0.6%).

- Land use pattern: in terms of overall land use pattern based on the average of different types of land owned by the total 361 households in the sample, 53.3% of total land were rice field, followed by 27.8% of garden while pond consisted only 7.4% of the total land.

- Household income: Household income in the sampled households was both from agriculture and off-farm sources. Income from agriculture consisted of 92% of gross total household income. Off-farm income consisted only 8% of the total household income. In terms of the importance of the system depicted by the value of gross income, rice income was the main source of income of the sampled households and consisted of 30% of gross income. Income from animal raising was the second most important source of household earning and accounts for 27% of the total income to the household. Fish income ranked third in the gross income of the total sample.

- Cultured fish species: In terms of the proportion in the total stocking structure of the 301 fish growing household, tilapia was, on an average, 27% of the total fish stocked in a household. Next to tilapia, the silver barb (15%) and giant gouramy (13%) are of secondary importance in the stocking structure. Other popular species in the order of importance include common carp, hybrid catfish, silver carp, river catfish (Tra), Indian carp, kissing gouramy and grass carp.

- Distribution of harvested fish: Fish culture in the sampled households was relatively commercialized as more than half of fish produced in the sampled households were sold (58%). Despite the fact that the average years of culturing fish in the sampled households were only 5 years, fish culture has developed rapidly in the surveyed areas. This also implied that there was a market ready to absorb the fish products in the province. Only 20% of fish was consumed by the households. Restocking and in-kind payment were also important use of harvested fish.

- Sources of information on aquaculture: Farmers in the sampled survey were introduced to aquaculture through various sources. Based on multiple response analysis, 29% of respondent learnt about aquaculture through TV and radio, 21% from extension materials, 19% from participating in extension classes, 10% from newspaper and magazine and 10% from visiting other model farmers by themselves. To a lesser extent, visits to other farmers organized by extensionists, IPM program and other organized exchange were also their opportunities to be introduced to aquaculture. Regarding source of specific technical knowledge on their current practice of aquaculture, 25% of the farmers stated that their current method of practice were based on their own idea. As for external sources, the most important source was other farmers (20%) followed by mass media (18.5%), extension materials (14%) and aquaculture training course (12%). Other sources of technical information for fish culture for farmers were seed suppliers, extensionist visiting the farm and on-farm visit organized by extensionist which were the reported by 7% of the respondents.

On-station Research

Broodstock Management, Artificial Propagation and Nursing

Development of technology for broodstock management of three indigenous fish species (snakeskin gouramy, climbing perch and Hoveni's slender carp). The successful artificial propagation of snakeskin gouramy and climbing perch was achieved and nursing technology has been elaborated by testing the stocking density and feeding regime. During the last season 6.1 millions fries and 51,000 fingerlings of snakeskin gouramy were produced. In case of the climbing perch the amount of fries was 8,060,000.

Development of Grow-out Technology for Snakeskin Gouramy and Kissing Gouramy in Polyculture

The experiment was carried out to develop suitable technology for grow-out of snakeskin gouramy and kissing gouramy in polyculture. The tested species structures were feasible both technically and financially. The highest yield was achieved in

kissing gouramy-dominated (75%) structure, while the best economic was found in the snakeskin gouramy-dominated (75%) structure, due to the high price of the latter.

On-farm Research

Establishment of Backyard Hatchery

The hatchery management and seed production group transferred the results of the on-station research on the techniques of the artificial propagation and nursing of snakeskin gouramy as well as assisted in adaptation of this technique for kissing gouramy. The new hatchery and nursery achieved good results, in some areas exceeding those obtained on-station: e.g. the survival rate of snakeskin gouramy fingerlings was 56% vs. 12%. During the last season 210,000 fries and 25,100 fingerlings of snakeskin gouramy were produced. In case of the kissing gouramy the amount of fries and fingerlings was 420,000 and 86,000 respectively. In an area effected by acid sulphate soils (Tan Phuoc District) this farm can become the first backyard hatchery in this district.

Researcher-Managed AC/VAC On-farm Trials

A modified model for fish culture in area effected by acid waters (Tan Phuoc District) was tested in four households with special pond preparation, decreased stocking density (3 fish/m^2) and different stocking structure (tilapia 25%, river catfish 25%, kissing gouramy/snakeskin gouramy 50%). The applied model resulted in good yields (6.1-7.0 t/ha). The results of the financial analysis showed moderate profit (average IRR 17%) (Table 1), in-spite of the unusually low fish prices at the moment of completing the trials (March). The results of these researcher-managed trials showed the technical feasibility of integrated fish culture in the acid-sulphate affected area.

Four households were involved in testing a modified model of fish culture in ponds with limited water exchange (Go Cong Dong District), with decreased stocking density (2 fish/m^2) and different stocking structure (tilapia 50%, silver carp 25%, grass carp/river catfish 25%). The applied model resulted in good yields (4.9-7.3 t/ha). The results of the financial analysis showed good profit (average IRR 127%) (Table 1), in spite of the unusually low fish prices in the moment of completing the trials (March). The results of these researcher-managed trials showed the technical feasibility of integrated fish culture in this area with limited water exchange.

Researcher-managed Rice-fish On-farm Trials

On-farm research on "Integrated agriculture/aquaculture" was initiated in twenty households. Appropriate fish species, stocking structure and densities were tested in areas affected by flood (Cai Be District), by acid sulphate soil (Tan Phuoc District), and by salt intrusion (Go Cong Dong District) as well as in depression areas (Go Cong Tay District).

The trials resulted in good yields, with typical differences between the three successful areas. The highest average yield of 693 kg/ha (412-902) was obtained in Cai Be. Go Cong Dong and Go Cong Tay produced almost similar results: 428 kg/ha (201-619) and 352 kg/ha (275-418) respectively. Farmers applied partial feeding during the early stage of fish growth. The four research trials in Tan Phuoc district resulted in very low yields from 25-103 kg/ha. The participating households did not

follow the recommendations of the project: the plastic "fence" (against the rodents), constructed between the rice field and the trench preiended the fish from going to the rice-fields. The average yield from the on-farm trials was 468 kg/ha while the on-farm research farmers had 386 kg/ha. The on-farm trials also performed financially better than the on-farm research with IRRs of 154% vs. 145% (Table 2).

Table 1: Principal findings on technical and financial performance for VAC trials and research

	VAC trials					VAC research				
Agro-ecological zone	Number of farmers	Yield (t/ha)	STD	IRR (%)	STD	Number of farmers	Yield (t/ha)	STD	IRR (%)	STD
Area affected by acid soil	13	5.5	2.6	25	71	4	6.7	0.3	17	6
Area affected by stagnant water	15	5.2	2.1	47	66	4	6.2	1.0	127	80
Area prone to flooding	15	6.9	3.0	23	42					
Inland	46	5.1	1.4	35	61					
Average	**89**	**5.5**	**2.1**	**33**	**60**	**8**	**6.4**	**0.7**	**72**	**79**

Table 2: Principal findings on technical and financial performance for rice-fish trials and research

	Rice-fish trials					Rice-fish research				
Agro-ecological zone	Number of farmers	Yield (kg/ha)	STD	IRR (%)	STD	Number of farmers	Yield (kg/ha)	STD	IRR (%)	STD
Area affected by acid soil						4	70	33	2	48
Area affected by stagnant water	4	294	83	112	125	5	475	100	192	112
Area prone to flooding	4	643	212	195	24	2	794	30	311	68
Average	**8**	**468**	**239**	**154**	**95**	**11**	**386**	**285**	**145**	**145**

On-Farm Trials

The farmer-managed on-farm trials were carried out in 92 poor households, in representative agro-ecosystems of Tien Giang Province: flooded area, acid sulphate area, inland area and salt intrusion area. The trials aimed at adapting the existing technologies to different social and environmental conditions to test their technical and financial/economical feasibility.

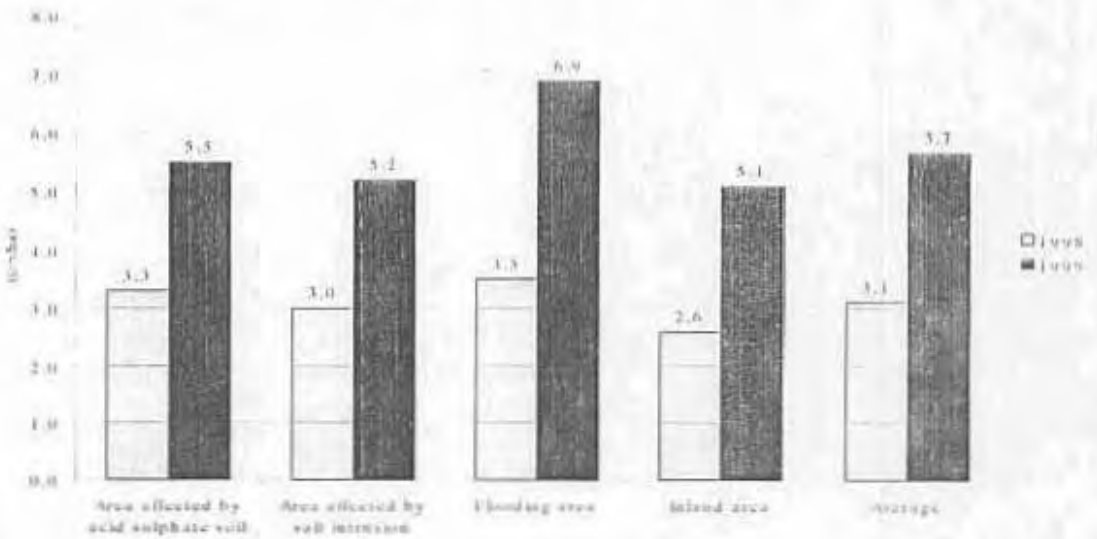
The tried technologies represented two forms of integration of fish culture in ponds with livestock and/or agriculture (AC/VAC). From technical point of view, the trials aimed at decreasing the high stocking densities (10-12 fish/m^2), improving the feeding strategies and balancing the integration between different sub-systems of the farms. Specific recommendations on pond preparation, species composition and use of on-farm inputs have been elaborated for different agro-ecological zones.

After 10-11 month of trials ponds were harvested (earlier than optimal for the farmers) to assess technical feasibility. In general it can be stated that the tested technologies proved to be technically feasible compared with the fish yield in 1998 prior to the project implemented (Figure 1). High yields were reached in general (5.5 t/ha average for the whole province), as well as in all four agro-ecological zones (minimum 5.1 t/ha average for inland – maximum 6.9 t/ha average for the flooding) (Table 1). Tilapia and river catfish were dominant fish species in combination with

kissing gouramy, silver barb and common carp. The financial viability of trials was satisfactory in general (average IRR 28%), but showed variations among the farms (from –3% in Tan Phuoc to 55% in Go Cong Dong). One of the key elements of the project approach is that the farmers were advised to as far as possible to use resources available on the farm, e.g. animal manure, green matter and kitchen waste. But still, the farmer has to buy some feed at times where on-farm resources are not sufficient.

During the final harvests of the trials (February – March, 2000) fish prices were unusually low (and specially lower than in the fish price monitoring survey, carried out during July 1998–June 1999) in most of the districts of Tien Giang Province. Few farmers sold their fish production after the final harvest, however most of the farmers decided to continue the grow-out until April-June, expecting higher fish prices in the province. Therefore, stocking season and harvest time should be aware to produce fish at reasonable price.

Figure 1. Average fish yield in 1998 & 1999 by agro-ecological zones



Follow-up Activities

Based on the outcome of the completed surveys and the first year trials, the formulation of the extension strategies and the proposal for the second phase of the component will be completed with the assistance of a consultant on extension strategy. The proven technologies will be extended through using various types of extension approach. These include:

- Farmer-to-farmer visits, where farmers get a chance to see how other farmers in a similar area are managing their ponds and tackling problems. Importantly, advise will be given in farmers own language and terms and the exact pressing problems can be addressed.
- Demonstrations by research center/station, seed nursery or 'master farmer'.
- Mass media, e.g. television, radio, newspaper.
- Farmer associations could also be used as a vehicle for spreading information.

Improvement of Extension Services for Aquaculture Development and Poverty Alleviation in Rural Areas of the Southeastern Vietnam

By
Nguyen Van Tu and Trinh Truong Giang
Faculty of Fisheries
University of Agriculture and Forestry
Ho Chi Minh City

Abstract

The southeastern provinces (SEPs) of Vietnam show a diverse potential for aquaculture with different pond systems, cage and pen fish culture. Small-scale aquaculture plays an important role in nutrition and income improvement in rural areas of Southern Vietnam. Since 1994, in collaboration with the Aqua Outreach Program of the Asian Institute of Technology (AIT-AOP) the Faculty of Fisheries of the University of Agriculture and Forestry (FoF-UAF) has implemented farmer-managed on-farm trials in two different agro-ecological (rain fed and irrigated) areas of three provinces, Binh Phuoc, Long An and Tay Ninh to develop appropriate recommendations of fish culture in ponds for small-scale households in the SEPs. Baseline surveys carried out prior to the trials have pointed out problems of fish culture of the farmers in the targeted areas, e.g. pond preparation, cultured-fish selection, stocking density, and water quality management.

After 3-year implementation of the on-farm trials, a set of recommendations of low-cost fish culture for the small-scale farmers in the two agro-ecological areas have been produced. The average fish yield of 56 project farms in the three provinces has increased around 25, 40 and 70%, respectively. Since 1996 the project staff have collaborated with Agricultural Extension Centers (AECs) of the three provinces to train about 700 farmers on fish culture based on the proven recommendations. Moreover, three sets of leaflets on fish culture in ponds for different agro-ecological areas based on appropriate techniques have also been designed to support extension activities of the provincial AECs.

The fish culture on-farm trials have been shown to be an efficient method to produce appropriate recommendations for the small-scale farmers. Recently, fish culture development has contributed to poverty alleviation of the provinces. However, some difficulties in implementation of the trials need to be overcome for further expansion.

Introduction

Fish is a traditional food of the Vietnamese people. In the past fish was supplied mainly from capture in natural water bodies. However, the distribution of aquatic resources is not even for the whole country. In Southern Vietnam, the average fish consumption of people who live in the upland areas, around 9 kg per person yearly is lower than that of people in the Mekong River delta, 25 kg per person yearly. Recently, the wild fish supply has declined due to overfishing and environmental degradation. In Vietnam aquaculture has been practiced for long time in lowland areas but is poorly developed in upland ones. In 1993, an extension service system was established in the country. Under this system aquaculture extension to transfer

fish culture techniques to farmers in Southern Vietnam has had some preliminary success.

Can aquaculture development contribute to poverty alleviation in rural areas? How can sustainable aquaculture of households in regions be developed where farmers have no or limited skills and experiences? And how can poor farmers be assisted to access appropriate techniques of aquaculture, which are consistent with their objectives and resources? Since 1994 one collaborating project between the Aqua Outreach Program of the Asian Institute of Technology (AIT-AOP), a network of national institutions coordinated through AIT (AIT 1994), and the Faculty of Fisheries, University of Agriculture and Forestry (FoF-UAF) has been implemented in the southeastern provinces (SEPs) of Vietnam (Tay Ninh, Binh Duong, Binh Phuoc and Long An) to develop small-scale aquaculture. With the methodological approach of "farming systems research and extension" (FSR & E) (Edwards and Demaine 1998) through farmer-managed on-farm trials, appropriate recommendations for fish culture in ponds has been produced and the efficiency of extension activity of provincial Agriculture Extension Centers (AECs) have been improved.

Methodologies

In order to understand better extension activities to transfer techniques to fish culture farmers in the target region, a survey have been conducted to review methods applied by the AECs of SEPs their efficiency. The efficiency of the aquaculture extension services was evaluated based on the percentage of technical adoption of the farmers who have received recommendations from the AECs. The efficiency was also analyzed for the provinces with different aquaculture potentials. Two main weaknesses limiting the efficiency of aquaculture extension activities were found. They were (1) the weak cooperation between research and extension agencies oriented to solve problems of the farmers, and (2) many recommendations produced from research institutions and transferred by extension networks to be inappropriate to conditions of the small-scale farmers who have poor resources to develop their operation.

Since 1994 onwards, FoF-UAF has adopted the approach of farmer-managed on-farm trials, which has been successfully practiced in Northeast Thailand (Edwards et al. 1996), to produce appropriate recommendations to small-scale fish farmers of the SEPs. This approach also aimed to produce adequate extension materials to support the technology transfer activity of the AECs. The fish culture on-farm trials were implemented through a number of steps as follows:

Baseline Survey

One of the objectives of baseline survey is to identify potentials and problems of fish culture of the existing farming systems. In 1994, FoF-UAF staff carried out a baseline survey in the two target provinces of Tay Ninh and Song Be (then Binh Duong). In 1996, other baseline surveys were done for the new sites when the fish culture on-farm trials were expanded to Binh Phuoc, Long An and other parts of Tay Ninh provinces.

Prioritization of Common Problems of Small-scale Fish Culture in the Target Areas

Based on the analysis of the baseline surveys, common problems of small-scale fish farmers were prioritized. Since then, promising recommendations, which could solve the most common problems of fish culture, were reviewed and proposed for testing during on-farm trials.

Project Farmer Selection and Promising Recommendation Testing

Promising recommendations were tested with project farmers who were willing to adopt new methods and technologies. The selected households for the trials should be representative for fish culture systems in the target areas. After selecting farmers, the project staff discussed with each household all elements that formed the farming system, such as the amount and variety of available resources, the potential production of the farm, and the possible solutions for its problems. Project staff visited the farmers weekly or fortnightly to provide technical support and advice.

Appropriate Recommendation Dissemination

Tested recommendations, which were under the management of the farmers and the supervision of the project staff, were evaluated based on the percentage of adoption. The appropriate techniques then were disseminated to other farmers in the target areas through the activities of the AECs such as farmer training and extension material production.

The impacts of the on-farm trial program of AIT-AOP in Southern Vietnam to produce and disseminate appropriate techniques to the small-scale fish-culture farmers in the region were evaluated based on fish yield, economic efficiency and level of proven technique adoption.

Results and Discussion

Limitations of Aquaculture Extension Service of Provincial Agriculture Extension Centers

Compared to provinces in coastal areas and the Mekong River delta, provinces in the southeastern region have less potential for fisheries. In addition to technique transfer in agronomy, animal husbandry and forestry, the AECs of these provinces are also responsible for technology transfer in fisheries and aquaculture. One of the limitations for aquaculture extension activities of the SEPs is the underestimate of aquatic resources which leads to a shortage of aquaculture extensionists who are trained in fisheries to serve for technology transfer, particularly at district lines. Aquaculture extensionists, if available, are not well trained in extension methodology such as gathering data, being in contact with the farmers, and giving advice and assistance to solve farmer problems.

Although the AECs have established good relationships with research institutions and universities, included the UAF, to improve their services through staff training and technical support the efficiency of the support was low since these organizations have not considered the problems of small-scale farmers as a priority of their research and have not collaborated with the AECs to carry out on-farm trials to produce appropriate recommendations for them. Moreover, there are no long-run extension

programs comprising planning, implementing, monitoring and evaluating stages to serve the aquaculture development strategy of the provinces.

Types of aquaculture extension services

The common methods applied by the provincial AECs to transfer techniques to farmers are farmer training and setting up demonstration farms.

Farmer Training

Farmer training in aquaculture is similar for agronomy and animal husbandry. Because of requests of farmers as well as the mandate of provincial governments, despite their lack of qualified staff, the AECs have to organize training to transfer aquaculture techniques to the fish farmers. The procedure of organizing farmer training is similar for the all AECs. The need of training of the farmers is indicated to the AECs through local officials or NGOs' staff (mainly at district and commune levels). Based on the approved annual plan the AECs will allocate a number of training courses for each district. When the request is accepted, local officials are responsible for gathering farmers, preparing the meeting room and audio-visual materials, and the AECs are responsible for providing trainers, extension materials such as leaflets, and funding. The trainers can be extension staff and/or frequently, lecturers from universities and scientists from research institutions for specific topics.

The amount of farmer training on aquaculture of the AECs during the last three years is presented in table 1.

Table 1: Number of farmer training courses in aquaculture and participants by Agriculture Extension Centers of southeastern provinces in 1995-97.

Province	1995			1996			1997		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Tay Ninh	4	180	45	5	253	51	2	24	12
Dong Nai	11	700	64	17	1180	69	28	1554	56
Binh Duong	5	280	56	3	190	63	0	0	0
Binh Phuoc	-	-	-	-	-	-	0	0	0
Long An	74	1736	23	109	3011	28	53	1590	30

Note: (1) Number of courses of farmer training; (2) Number of participants; (3) Average number of the participants per training course.

In general the number of training courses given by the AECs' staff on aquaculture was lower than that on agronomy and animal husbandry. The number of training courses in aquaculture of Dong Nai province was increased yearly. In 1997, Binh Duong and Binh Phuoc could not organize any farmer training on aquaculture due to lack of staff with background in fisheries. The number of training of Tay Ninh declined in 1997 and of Long An also declined yearly due to quality problems.

Training content depended upon the specific requests of farmers for certain aquaculture systems. Table 2 presents the training courses on different aquaculture systems of the AECs of Dong Nai and Long An provinces as an illustration. In Dong Nai province, the training on fish culture in cages and shrimp culture were highest, since the local government had policy to develop these two systems in 1995. However, due to an unsolved problem of fish and shrimp diseases, the training on these systems was reduced quickly in 1997 and replaced by training on fish culture in ponds. Similar changes occurred in the AEC of Long An province.

Table 2: Amount and percentage of farmer training carried out by the Agriculture Extension Centers in 1995-97.

Topics	1995		1996		1997	
	Number	%	Number	%	Number	%
Dong Nai						
- Fish culture in ponds	2	18	5	29	16	57
- Fish culture in cages	6	55	6	35	8	29
- Shrimp culture	3	27	5	29	0	0
- Disease prevention and treatment	0	0	1	6	4	14
Total	**11**	**100**	**17**	**100**	**28**	**100**
Long An						
- Fish culture in ponds	20	27	34	31	20	38
- Rice/fish culture	33	45	26	24	15	28
- Freshwater prawn culture	2	3	3	3	1	2
- Marine shrimp culture	19	25	40	37	16	30
- Fish seed nursing	0	0	6	5	1	2
Total	**74**	**100**	**109**	**100**	**53**	**100**

The efficiency of farmer training of the AECs measured by the percentage of technical adoption of the farmers who attended the training is presented in table 3. The adoption level was evaluated for basic techniques of fish culture in ponds such as pond drying, bottom-mud removal, predator elimination, liming and fertilization.

The adoption level of the farmers in SEPs after the training was lower than that in Long An, one province of the Mekong River delta. During the training the trainers always presented the whole package of techniques relevant to certain aquaculture systems. This caused difficulty to the farmers to identify appropriate recommendations, which could solve their problems. Because of the lack of manpower and knowledge, offering too many topics on different aquaculture systems (Table 2) also limited the quality of training due to low availability of appropriate recommendations. Moreover, the limited number of training courses on aquaculture due to lack of funding also resulted in high number of participants per course and low efficiency of the training. By contrast, the AEC's staff of Long An province only trained the farmers in certain technical steps of the whole package of certain culture systems and then upgraded their knowledge later. Moreover, the AEC of Long An have collaborated to train local NGOs' staff who later could train their members. This cooperation has increased the impact of training with less expense.

Table 3: Impact of farmer training on fish culture of Agriculture Extension Centers.

Province	Techniques applied by farmers before training (%)	Techniques adopted by farmers after training (%)	Surveyed households (Number)
Binh Duong	0 – 29	0 - 57	21
Tay Ninh	5 – 30	20 - 45	20
Dong Nai	0 – 60	13 - 73	30
Long An	10 – 15	50 - 80	20

In general, there were some constraints of the farmer training on aquaculture as follows:

- The techniques given during training were mainly based on on-station research and were not consistent with the socio-economic conditions of the farmers in different agro-ecological areas;
- The method of training was very simple without training aids so it limited the understanding of the farmers;
- Due to lack of a survey before and after the training, there was no evaluation of efficiency on the farmers.

Setting Up Demonstration Farms

Setting up demonstration farms is also one extension method commonly used by the AECs. A demonstration farm is the model of a certain aquaculture system to be promoted. To set up one demonstration farm, the AECs provide a small amount of investment funding support such as seed and feed. The selected households were required to contribute the rest of the needed investment. The AECs' staffs also provide technical inputs for the households. The number of demonstration farms on aquaculture established by the AECs is presented in table 4.

Table 4: Number of demonstration farms on aquaculture established by the provincial Agriculture Extension Centers in 1995-97.

Province	1995		1996		1997	
	Number	%[1]	Number	%[1]	Number	%[1]
Dong Nai	15	10	28	14	46 (14)	14
Binh Duong	21	23	0	0	0 (0)	0
Binh Phuoc	-	-	-	-	0 (0)	0
Tay Ninh	7	5	14	9	n.a.	n.a.
Long An	67	5	75	5	75	23

Note: %[1]: percentage over total demonstration farms established by the AECs (n.a =not available)

The amount of demonstration farms on aquaculture of Dong Nai and Tay Ninh increased whilst Binh Duong and Binh Phuoc did not set up aquaculture demonstration farms due to lack of staff having a background in aquaculture. The AECs have tried to set up demonstration farms, which could be representative for existing aquaculture systems in the provinces (Table 5).

Table 5: Aquaculture systems of the demonstration farms established by the AECs in 1995-97.

Systems	1995		1996		1997	
	No.	%	No.	%	No.	%
Dong Nai						
- Pond fish culture	7	46	17	60	50	66
- VAC* systems	1	7	1	4	1	2
- Rice/fish culture	1	7	0	0	2	4
- Cage fish culture	3	20	9	32	9	20
- Shrimp culture						
Marine shrimp	0	0	0	0	1	2
Freshwater prawn	2	13	0	0	1	2
- Specific animal culture (frog, soft turtle)	1	7	1	4	2	4
Total	**15**	**100**	**28**	**100**	**46**	**100**
Tay Ninh						
- Cage fish culture	1	14	0	0	n.a.	n.a.
- Pond fish culture	4	57	12	86	n.a.	n.a.
- Freshwater prawn culture	2	29	0	0	n.a.	n.a.
- Duck-fish integrated	0	0	2	14	n.a.	n.a.
Total	**7**	**100**	**14**	**100**	**n.a.**	**n.a.**
Long An						
- Pond fish culture	17	25	22	29	23	31
- Integrated fish culture	2	3	10	13	20	27
- Rice/fish culture	33	49	26	35	29	38
- Fish seed nursing	0	0	5	7	1	1
- Shrimp culture						
Marine shrimp	13	20	9	12	0	0
Freshwater prawn	2	3	3	4	2	3
Total	**67**	**100**	**75**	**100**	**75**	**100**

Note: VAC*: garden-fish pond-animal pen; (n.a.= not available.)

Due to lack of manpower, the establishment of many demonstration farms has led to difficulties in monitoring, technical support and evaluation. To ensure the success of the demonstration farms, the AECs staff usually selected farmers who were quite rich and experienced. Therefore, there are constraints to expand aquaculture techniques through demonstration farms, even though they were economically efficient, due to the following reasons:

- The selection of quite rich and experienced farmers leads to their irrelevance to resource-poor, small-scale farmers.

- Demonstration farms may not work due to the large variation between farmers in terms of physical resources and socio-economic status.

On-farm Trials as Means to Produce Appropriate Recommendations for Small-scale Fish Farmers

Results of the Fish Culture On-Farm Trials

Due to the lack of manpower, funds, facilities, and knowledge the dissemination of techniques developed by research organizations to farmers by extension agencies often follows a conventional, top-down method. As pointed out by Edwards and Demaine (1998), this mode of technology transfer is rarely effective because it usually fails to match the resource profiles of small-scale farms, which are diverse and complex. A wider perspective on research to develop and disseminate technology appropriate for the widely varying resource contexts of poorer farmers is required.

The implementation of farmer-managed on-farm trials on fish culture of AIT-AOP in Southern Vietnam aimed to improve the efficiency of small-scale aquaculture and its extension in the SEPs. The main activities and their results are summarized in the following sections.

Baseline Survey

The aim of baseline surveys was to identify potentials and problems of small-scale fish culture in the target areas. The surveys have been conducted for different agroecological zones: in irrigated lowlands of Tay Ninh, upland rain fed agriculture of Binh Phuoc and flat lowlands of Long An (Nguyen et al. 1994; 1995). The main characteristics of pond fish culture system of the surveyed areas are presented in table 6.

Table 6: Characteristics of fish culture in different agroecological zones of Tay Ninh, Binh Phuoc and Long An provinces.

Characteristics	Irrigated lowlands Tay Ninh province	Rain fed uplands Binh Phuoc province	Rain fed flatlands Long An province
Fish culture experience	Low (<3 years)	Low (<3 years)	High (>4 years)
Water supply	Irrigation system	Rainfall	Rainfall
Pond size	Small and shallow	Large and deep	Small and deep
Grow-out period	All year	6 to 8 months	6 to 8 months
Purpose of fish culture	Subsistence and income improvement	Income improvement	Income improvement

Most farmers practiced a polyculture with high variation of fish species and at a very high density, used low levels of poor nutritional inputs. The most common input was rice bran. The second most common input was pig manure in Tay Ninh, cassava leaf in Binh Phuoc. Crop by-products from vegetable were rarely used in Tay Ninh and Long An but commonly used in Binh Phuoc. The concept of fertilizing fishponds to develop natural feed for fish was not widely understood and appreciated.

The main problems of households on fish culture development were lack of knowledge resulting in low survival rate, low yield, small size of harvested fish, and poor water quality (polluted, turbid).

Farmer-Managed On-farm Trial

In 1994, fish culture on-farm trials were started in Thuan An district of Song Be province (then Binh Duong) with a system of hybrid catfish (*Clarias gariepinus x C. macrocephalus*) culture in ponds and in Trang Bang district of Tay Ninh with the system of fish culture in an overhung latrine pond. In 1996, the trial in Binh Duong was discontinued due to urbanization of the area. At the same time the trial was expanded into Chau Thanh, Duc Hoa and Dong Phu districts of Tay Ninh, Long An and Binh Phuoc provinces, respectively. The number of trial farms during the period is presented in table 7.

Table 7: Number of project farmers in the target against the period.

Year	Project farms				Total
	Binh Duong	Tay Ninh	Long An	Binh Phuoc	
1994-95	8	6	-	-	14
1995-96	9	6	-	-	15
1996-97	-	6	8	8	20
1997-98	-	36	10	10	56

Based on identified problems and available technique resources, promising recommendations were proposed to the project farms. The acceptance and adoption of proposed recommendations varied depending on farmers' conditions. Table 8 presents appropriate recommendations identified for irrigated areas of Tay Ninh province as an illustration.

Table 8. Recommendations proposed for fish culture and their acceptance in irrigated areas.

Problems	Causes	Recommendations	Acceptance	Reasons
Low survival rate	Predation	Predator elimination	-	Ponds are dried at the end of the season
	Stocking small fry	Nursing fry in hapas	-	Difficult management
		Purchase larger fry	+/-	Depending on fry availability
	Escape due to run off	Netting	-	Poor quality and net
		Dike improvement	+	Labor available
	Incorrect stocking methods	Adequate stocking and higher feeding	+	Easy to adopt
Low yield and small Harvested fish	Unsuitable species stocked	Supplementary cultured species	+	Fry available
	Incorrect ratio	Ratio adjustment	+	Easy to adopt
	High stocking density	Density adjustment	+	Easy to adopt
	Poor feeding	Increasing feeding	+	By-products available
		Fertilizing with animal manure	+	Manure available
Water pollution	Overloading with organic matter	Balance between pond area and number of pigs	-	Depending on benefit of pig raising
		Water color management and exchange	+	Water supply available

Note: + is accepted and - is rejected

Appropriate recommendations were identified as those adopted by a high percentage of project farms. These recommendations should also improve the fish yield of the

farm. After 4 years of implementing the trials, the average fish yield increased (Table 9).

Table 9: Fish yield of the project farms in different agroecological zones of target provinces.

District/agro-ecological zones	Extrapolated fish yield (tons ha^{-1} $year^{-1}$)			
	1994-95	1995-96	1996-97	1997-98
Thuan An /Rain fed lowlands	3.94[a]	5.37 (36)	-	-
Trang Bang/Irrigated lowlands	3.95[a]	7.43 (97)	9.49 (27)	6.21 (-35)
Chau Thanh/Irrigated lowlands	-	-	3.66[a]	4.62 (26)
Dong Phu/Rain fed uplands	-	-	3.50[a]	4.98 (42)
Duc Hoa/Rain fed lowlands	-	-	2.70[a]	4.73 (75)

Note: a) the yield before on-farm trials *values in parentheses are increased/decreased percentage compared with previous year*

The yield of fish culture in the trial farms has increased yearly. However, the fish yield of 1997-98 crops in Trang Bang district declined due to unstable water supply from the irrigation system.

Since 1996, the project staffs have collaborated with the AECs of Long An, Tay Ninh and Binh Phuoc to train more than 700 farmers on fish culture based on the tested recommendations. From the fish culture trials in Tay Ninh, one extension booklet titled "Fish Culture in Earthen Pond" was designed and tested in 1996. Five hundred copies of the final version of the booklet were printed to support farmer training of the AECs of SEPs. However, the cost of the booklet was too high to be reprinted. Therefore, in 1997 three sets of leaflets on fish culture in ponds for different agroecological areas based on proven techniques were designed for the AECs' use.

A major constraint to the improvement of rural livelihoods through aquaculture is the inefficient transfer of research findings through service providers (Edwards and Demaine 1998). In 1995, 64 extension staff of Long An, Tay Ninh and Song Be (former) were trained on integrated fish culture and extension methodology. Since 1996 41 extension staff have been trained on methods of fish culture on-farm trials and extension material production. In March 1998 one modular training program on aquaculture systems was also offered to 22 local staff of the collaborating provinces. This training upgraded the knowledge and skills of staff to efficiently transfer techniques to fish farmers.

Small-scale Fish Culture Development as Means of Poverty Alleviation

Economic Efficiency of Fish Culture

Gross benefit of fish culture was much higher than that of cultivated crops based on area unit. Moreover, the benefit of crop plants was heavily depended on weather conditions and market prices. Most of the farmers in the regions were lost from groundnut cultivation in 1997-98 and 1998-99 crops due to bad weather and low price of the product. The benefit-cost ratio of fish culture was from two to five times higher than that of crop plants (Table 10). It should be emphasized that another intangible benefit of fish culture is the on-farm availability of fish for household consumption and for sell at urgent need of cash.

Table 10. Average gross benefit (GB, VND1,000) and benefit-cost ratio (BCR) of main crop plants and fish culture of the project farms in different agroecological zones of target provinces.

Sites and crops	1997-98		1998-99	
	Gross benefit[a]	BCR	Gross benefit[a]	BCR
Trang Bang/Irrigated lowlands				
Rice	83.0	0.33	n.a.	n.a.
Groundnut	-102.4	-	n.a.	n.a.
Fish	318.1	2.51	201.9	1.95
Chau Thanh/Irrigated lowlands				
Rice	87.6	0.31	107.4	0.28
Fish	196.4	1.76	223.2	2.39
Dong Phu/Rain fed uplands				
Rice	136.8	0.55	195.3	0.65
Cassava	255.0	1.33	299.0	1.26
Fish	213.0	2.42	190.7	3.63
Duc Hoa/Rain fed lowlands				
Rice	268.6	0.78	223.0	0.67
Groundnut	80.0	0.24	-50.1	-
Fish	206.5	1.03	275.1	1.60

Note: [a] GB is estimated for 1,000m^2 of crop plants and 100m^2 of fish culture; (n.a. = not available)

Contribution of Household Income From Fish Culture

Although the average area of fish culture (220m^2 in Trang Bang, 340m^2 in Chau Thanh, 1000m^2 in Dong Phu and 160m^2 in Duc Hoa) was much lower than that of cultivated area (5300m^2, 7300m^2, 8500m^2 and 6700m^2, respectively) and benefit of fish culture seemed to contribute significantly to household income. Interestingly, the contribution of benefit of fish culture in rain fed-upland was exceeded that of cultivated crops (Table 11). In general, the contribution ratio of benefit of fish culture over total on-farm income was estimated about 24-68% for households in irrigated-lowlands of Tay Ninh province, 45-55% in rain fed-uplands of Binh Phuoc, and 6-34% in rain fed-lowlands of Long An.

Table 11: Average gross benefits (VND1,000/household) from cultivated crop and fish culture of the project farms in different agroecological zones of target provinces.

District/agroecological zones	1997-98		1998-99	
	cultivated crop	fish culture	cultivated crop	fish culture
Trang Bang/Irrigated lowlands	205.7	624.9	n.a.	582.2
Chau Thanh/Irrigated lowlands	2,209.5	676.4	n.a.	710.2
Dong Phu/Rain fed uplands	1,286.9	1,637.4	2,285.0	2,741.8
Duc Hoa/Rain fed lowlands	832.4	309.9	874.7	450.1

Note: n.a. = not available

Conclusions

The development of aquaculture has contributed to diversification of agricultural production, nutritional improvement and income generation in the rural areas of southeast provinces of Southern Vietnam. Extension services play a more and more important role in aquaculture development. Today universities and research institutions are required to be involved into rural development programs supported by international organizations. The involvement of the universities and research institutions in those programs is mainly in human resource training and technical support. Their role in extension services is also respected by central and local government. The willingness of small-scale fish farmers to adopt appropriate technique has been recognized in the region. The success of fish culture of the small-

scale farmers may stimulate them to shift from subsistent to more commercial systems. This means that there will be increased needs of advanced techniques of fish culture in the future, e.g. from low-input and yield systems to high-input and yield ones (Edwards et al. 1996). The approach of "farming systems research and extension" implemented in the region has shown efficiency in terms of production of appropriate recommendations for small-scale fish farmers and extension service improvement. This approach requires frequent visits of extensionists to target households during the process of testing recommendations and extension materials based on proven techniques. Therefore, the local government needs more incentives for implementation of the approach such as increasing resources for extension service and providing better working conditions.

Moreover, the farmers have also shown their own capacity to experiment with and innovate in technology. Many of them have continued to develop their aquaculture systems with less or without technical support. The use of experienced farmers as promoter in extension services e.g. farmer training and farm visit, also increases the efficiency of technology transfer

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Household Adaptations in Coastal Economies

By
Berit Aasen, Norwegian Institute for Urban and Regional Research (NIBR),
P.O.Box 44, Blindern, N-0313 Oslo, Norway
Tel. 47-22 95 88 00, Fax 47-22 60 77 74
e-mail: berit.aasen@nibr.no

Abstract

The main objective of our project is to study the impact of the economic reform in Vietnam (Doi Moi) on the fisheries and fishing communities, and how these developments affect the resource utilization and possibilities for resource management. This paper consists of two parts, Part I: Discussion of households adaptations in the coastal areas, and Part II: Presentation of the historical development of the fishing communities that are covered by our study, from the collapse of the fishing co-operatives and up to today. This presentation include the demise and end of the co-operatives in the fishing sector and the return to the household and family based fisheries, and the current livelihood situation and household adaptation in six fishing communes in the North of Vietnam, all belonging to the Tonkin Bay fisheries.

Key words: Vietnam, marine resources, fisheries, resource management, reform, household adaptation

Introduction

This paper is based on a research project where fieldwork will be carried out in Quang Ninh, Hai Phong, Nghe An and Khanh Hoa provinces. The project is funded by the Norwegian Research Council, and runs from 1998-2001, and is carried out jointly with Vietnamese researchers. The project includes 10-12 local level fieldworks, as well as extensive interviewing with actors at national and provincial level. Our research partners in Vietnam are the Research Institute for Marine Products (RIMP), Hanoi National Pedagogic University/Department for Geography, and Research Institute for Aquaculture No.1 (RIA1).

The main objective of our project is to study the impact of the economic reform in Vietnam (Doi Moi) on the fisheries and fishing communities, and how these developments affect the resource utilization and possibilities for resource management. This paper consists of two parts, Part I: Discussion of households adaptations in the coastal areas, and Part II: Presentation of the historical development of the fishing communities that are covered by our study, from the collapse of the fishing co-operatives and up to today. The will look at the historical transformation of the fisheries; the demise and end of the co-operatives in the fishing sector and the return to the household and family based fisheries.

Part I: Household Adaptations in Coastal Areas

Background

We will discuss different household adaptation strategies, among different types of fishing /coastal households in central and Northern Vietnam.

The communities and villages we have studied are what are often classified as resource dependent community. Their income and livelihoods depend on harvesting the resources, and in the coastal areas this has often been synonymous with harvesting fish resources.

In times of crises in the fisheries, the usual livelihood strategy is to intensify the activities both the fisheries by making longer trips, to cover more fishing grounds, and fishing in bad weather, -and in other economic income earning opportunities. However: fishing remains the single most important activity, especially for the poor and in the coastal and inshore waters, both for food security and for cash income.

Given this background, the declining coastal marine resources (fish), is a relevant time for increasing the effort for aquaculture development. Households are interested in investing in new income opportunities, given that the risk is not too high.

On the other hand there is increased reliance on coastal inshore fishing for the poor for their survival and livelihood. There is an increasing conflict potential in and between fishing communities (villages), between poor fishermen and aquaculture producers over the use of inshore areas. Land rights and user rights to inshore areas need to be decided and legally enforced.

Aquaculture development program should be careful not to create negative effects for the poor.

We See Several Strategies in Household Adaptations

There has been an extremely high level of response capacity and adaptations in fishing households since the de facto start of the reform in the early 1980s, when most of the fishing co-operatives collapsed and were dissolved, and when fishing households became dominant type of production in the fisheries. There has been a high growth in income in fishing communities, but (as most economic growth in rural areas) the growth has been unequal. Large parts of the coastal communities remain poor.

The most common adaptation pattern among the fishing families was to purchase a boat before or immediately after the collapse of the co-operatives, during the period of the contracting out of production targets/tasks in the co-operatives. This was easy as boats and gear were produced locally and there existed a large supply for second hand fishing boats. This investment was in many cases done while the fishing families were still receiving subsides/support from the government, in the form of cheap petrol, rice and cooking oil. Income for the fishing households could be quite high, and many of the successful households developed a cycle where they invested in new boats (or larger second hand boats) every 2-4 years.

With the declining resources in the coastal waters, there exist different adaptation strategies among this group of households:

- Investing in larger sea going vessels, being in the sea longer, and in more rough weather than before.
- Covering more fishing fields (intensifying competition), more specialization.
- Invest in other income generating activities (that require capital) like aquaculture, diversification.
- General intensification of multiple income earning activities.

When one talks about household adaptation, one often think of poor households and their adaptation in a situation of declining resources, and possible increasing poverty. Logical thinking could lead one to believe that there would be an increase in exit from the fishing by this group. However, this is not the case neither in Vietnam, nor among poor households in other Asian coastal communities. Poor people remain in the fisheries, using low cost technology, boats with small motors, or non-motorized vessels, and simple gears. Fishing is the poor families' last resort, and offer possible better futures than as landless laborers in the rural areas.

Poor fishing households mostly fish for their own consumption and for the local market. This does not mean that they are not knowledgeable about export market and to some degree integrated in this market. As an example, poor floating household in the floating villages in Hung Thang commune in Halong Bay have invested in floating houses with cages for fattening of live fish for the Chinese market (see description of the cases of individual fishing communes in PART II).

The poverty trap; where households are not able to take the opportunities present to them; because they lack access to the necessary resources/ especially credit; technology (boat and gear). One problem seems to be that they frequently are indebted. They have borrowed money from Agricultural Bank (or similar banks), and cannot pay back their loans, as the catches are poor and income low. For this reason they cannot get new loans to invest in other economic activities. The wives also seem frequently to be denied loans. The viscous poverty circle leads to a situation where these families frequently have to buy food on credit from the middlemen and shops to very high interest rate.

These families do not have any funds, nor can they get access to credit, for investing in aquaculture. When asked about the chances for finding work in the expanding aquaculture production, the response is rather negative. From time to time they can obtain some day labor jobs. Mostly household that invest in aquaculture seem to have enough family labor to take care of their aquaculture work, or in addition they hire night watchmen, which is a job most fishermen would try to avoid, as it is difficult to reconcile with active fishing. These households constitute what is called the "static poor", where the families remain poor in several generations, and have little access to school and health facilities.

The most usual household adaptation in poor households are multiple income generation, where fishing often remains the backbone for family protein consumption as well as for cash income. In addition the women, i.e. wife, grandmothers and grown up daughters work makes net, as well as repair, brings fish to the local market or to

middlemen (depending on the species). For example in Ninh Ich commune (Tan Dao Village), in Khanh Hoa province, the most common fishing vessel and gear are small bamboo boats and trample nets. The women take swimming crabs to the small middlemen who comes from outside to purchase the crabs, but bring surplus catches of fish to the local market in the commune. Usually the women in the household are active in other economic activities, like pig and chicken raising, noodle soup-making (for breakfast) etc. And if they can get access to land, the families engage in fruit growing and vegetable growing.

Depending on their ability to access credit and technology, and number of household members these families, and their health and working capacity, these households may be able to manage and make some savings for further investment.

Part II: Presentation of the Historical Development of the Fishing Communities

Introduction

Little academic work has been written on the structure and development of the Vietnamese fisheries, both in Vietnamese and in other languages. To address the research question of the impacts of the reform on the structure of the fisheries and on fishing communities, one ideally should be able to study and observe a before and after situation. This can rarely be done in any country, but in Vietnam the absence of reliable studies and statistics makes comparative diachronic studies even more difficult. This is an issue that is recognized by most researchers in Vietnam (see for example Kerkvliet 1996 for a discussion of this on the reform in agricultural production).

In our study we lack such observations. We therefore have to reconstruct what the structure and workings of the fishery sector and fishing communities looked like historically as well as describe the current day structure, on the basis of our interviews, but also using secondary data as well as any relevant literature we might come across.

This also has effect on our question: the impact of the reform on the fisheries. When we look closer the structure of the range of factors has impacted fisheries and the workings of the fishing communities over time. The effects of the wars and armed conflict, the effects on migratory patterns caused by political development and the impact of the economic policies at different epochs all have made their imprints on the fishing communities, but with different impacts in time and space. History spanning back to the time before the World War II therefore is important to the studies of the impacts of fisheries development in current day Vietnam.

There is almost total agreement about the description of the current state of fisheries in Vietnam Over-fishing leading to resource depletion of a coastal fishery system, which is approaching a serious crisis, causes the current picture. The access and efforts to fisheries has increased tremendously over the last 20 years, starting from the first signs of total failure of the co-operatives around 1979.

Presentation of Six Case Studies on Fishing Communes in Northern Vietnam (The Tonkin Bay Fisheries)

Primary data on changes at fishing community level for our project is collected through interviews and observations at local commune and hamlet level in selected areas in both North and South Vietnam.

By May 2000 the research teams have carried out fieldwork in six localities linked to the Tonkin Bay fisheries, and several (six) communes in Khanh Hoa province. The presentation here includes only the fishing communes involved in the Tonkin Bay fisheries. Further fieldwork will be carried out in the fall of 2000, to revisit a selected few of the cases in North and South Vietnam to collect more in depth data, on marketing and access to credits, and on fishery management. The project will publish working papers with more detailed analysis of the history and dynamics of the fisheries in each of the four provinces; Quang Ninh, Hai Phong, Nghe An and Khanh Hoa (see references).

Quang Ninh Province

Quang Ninh province is a border province to China (to Guanxi Autonomous province). There has always been a strong Chinese influence in the fisheries in this province. Around the turn of the century very few Vietnamese vessels entered into the offshore areas of Tonkin Bay, while it is estimated that more than 700 large Chinese sailing vessels (jonques) visited the area each year, using the Cat Ba Island as a temporary anchoring place against the storms and for new supply of water and food. Cat Ba was at that time part of the province, but is now administrated by the Hai Phong province.

In 1979 before and after the border war between Vietnam and China there was an exodus of Chinese Vietnamese from the Quang Ninh and other provinces in the North. Many, if not most, of these were fishermen.

After 1989 when trade in fish products was opened up for private traders, export to China has surged. There is a very well developed trade network, where many of the Chinese formerly living in Vietnam, and speaking Vietnamese, participate. Many of the Vietnamese in the coastal areas also speak some Chinese. Fish products, reaches the markets of Guandong and Hong Kong very rapidly, and gives good prices for live fish, and sea products like shrimp and oysters. There are several floating markets at sea, and it is usual for fishing boats to sell their catches at sea to Chinese traders. There is also a lively border trade in consumer products both along the coast and in the interior.

Hung Tang Commune

Hung Tang commune is a rural commune in Halong City District, located 20 minutes with car from the city center. The fishing population however does not live on land but are living in five floating villages, each of them registered as a village or hamlet, and represented by its village leader in the People's Committee in the commune. There are some fishing households on land, but these are either the very few more wealthy households, or mostly elderly people that have settled on land after a long period as floating household. Quite often some of their grandchildren from the floating households stay with them to go to school, for 1-3 years.

The co-operative was formed in 1960, when 15 private boats were registered as co-operative property in the two co-operatives that were established. Over the years the co-operative invested in some larger vessels, up to 33 hp., but the number of vessels remained the same, as new boats replaced older boats. The co-operatives were officially dissolved only in 1989, but de facto ceased to operate long time before. Family fishing continued through out the period 1969-89, officially for their own consumption, but included small-scale trade and barter trade. This probably meant that most families continued to live on their boats, and that few co-operative houses were built, and mainly used by children and old people. During the times of the co-operative most (if not all) of the catches from the co-operative boat went to the marketing co-operative and then to bulk processing for drying or fish sauce production, mainly to the provincial processing plant in Halong City. All catches from the co-operative boats had to be sold to the marketing co-operatives and to the state fish trading monopoly, in return the co-operative received fishing gear, petrol and other input, and rice and cooking oil.

The number of floating households increased by 50% from 180 in 1960 to 270 in 1998, with another 30 fishing households on land (1998). According to the People's Committee of the commune each household has one boat, making a total of 300 boats in the commune.

The current income and living standard of these floating villages is very low. As the coastal resources diminish their livelihood will be threatened. There are however some differentiation between the villages. The one located just outside the Hong Gai fish landing place, although not the economically poorest, as many of them also participate in small trading activities, is the one that mostly give the impression of a community on the margins of the society. The floating village located 4-5 hours by boat away from the commune center, Cua Van, has recently received credit through an Italian NGO, and have invested in floating houses and cage culture for the fattening of live fish for the Chinese market.

HOUSEHOLD ADAPTATION: The households have very limited access both to credits and to social services (health and education). However they have responded positively to the credits provided by an NGO, and participate in cage culture for the fattening of live fish for the Chinese market. However, a large number remains in the group of static poor, without any improvement in income and livelihoods.

Tuan Chau Island

Tuan Chau Island has been a model commune since 1958. The story is the Ho Chi Minh visited the island three times from 1956-1960 and it was here that he 1st April 1959 declared the National Fisheries Day to celebrate the Vietnamese fisheries. The island was gradually populated during the 1940 and 50s, and served as a base for resistance in the war against the French forces before 1954. The island was also a target for American bombing before 1972. The island is located close to Halong City and got access by road (by a new bridge) to land in 1999. Private tourism has not been developed, but the guesthouse for the high level party cadres is located on the island. Land reform has not been implemented, the agricultural co-operative is still intact, and all land belongs still to the state. One reason that land reform has not been implemented is that there are several conflicting views on how land should be zoned

and used, and there are strong forces that want to use the island's close proximity to Halong City to develop private tourist facilities.

Co-operatives were started in 1958, when many of the fishing families were still newcomers to the island from the coastal communes to the west of the island. Being a model commune the island seem to have preferential access to capital and credit from the state. It purchased several medium scale vessels in the 60s and 70s, and in 1979 the co-operative was able to purchase a large offshore vessel of 140 hp in 1979, that went all the way to Gulf of Thailand (Kien Giang province), and was usually gone 6-9 months a year. The co-operative was all the same dismantled in 1984, and the big vessel was sold to a transport company in Hai Phong. It was usual that vessels were sold to transport companies when co-operatives were dissolved. The design was often ill suited to fishing vessels, the vessels were often built in steel, and not in wood, which is the preferred building materiel for boat owners. What makes the co-operative in Tuan Chau Island exceptionally is that they were able to retain the money from the sale of the vessels in commune, until a new co-operative was established in 1987. Usually the co-operatives were so heavily indebted to the state that all income from sales of co-operative boats went to the state, and none remained in the communes.

The co-operative purchased four new boats in 1987 when it was re-established, with a capacity between 74-110 hp. This co-operative however, was short lived, and dissolved in 1992. A new co-operative was not established until 1998, to make the boat owners eligible for credit from the state offshore program. This is today the largest co-operative in Quang Ninh province, and has four office staff. The boat owners formed a co-operative with 96 members, 16 for each of the six offshore vessels. In principle the co-operative members are supposed to contribute collateral, equal to 15% of the cost of building the boat (credit is only given for the building of new oats, not for the purchasing of second hand boats). In Tuan Chau Island no co-operative members had contributed any collateral, which is similar to the situation we find in many other cases of credit from the offshore program. Although we do not have sufficient documentation from Tuan Chau Island, the situation might be similar to other cases of offshore credit, where most of the co-operative members were merely crew, while the captain, or the someone else in the commune was the "real owner", i.e. the new form of co-operative fronted for the privatization of access to offshore credit. When we visited the Island in October 1998 the vessels were out on their second trip, so it was too early to say whether the co-operative will be able to pay back the credit.

HOUSEHOLD ADAPTATIONS: There is an increasing investment in marine aquaculture to diversify income in the fishing households. The labor used for this is male labor, either relatives or hired labor (night watchmen). This work is not considered appropriate for women as it implies working at sea alone and often staying overnight as watchmen. Women in the fishing families and the Vietnamese Women's Union (VWU) complain about serious underemployment of women on the island. The ideal picture of the fisherman's wife on the island is as a housewife and as a mother. However, as the families depend on additional income to fishing, women try to add to household income by engaging in various economic activities. This includes fruit growing, pig raising, small trade and tailoring.

Hai Phong Province

Hai Phong province is an important province for the fisheries in Tonkin Bay. It borders Quang Ninh to the north and Ha Thinh province to the south. Hai Phong City is the biggest port in North Vietnam, and has historically been an important port for fisheries. Also industries related to fisheries, i.e. ship building and fish processing and fish trading is located in the city. The main fisheries research institute, Research Institute for Marine Products (RIMP) is located in the city. The Fisheries University (in North Vietnam) was located in Hai Phong until 1980 when it was moved to Nha Trang (and merged with the Fisheries University there). The Hai Phong area has therefore traditionally had a good supply of skilled manpower.

There are fishing communities along rivers and river mouths in the coastal districts in the province. However, historically the most important fishing districts have been Cat Hai with Cat Ba Island, and Do Son. Our fieldwork has taken place in these two districts.

Cat Ba Island

Cat Ba has always been an important island for the Tonkin Bay fisheries, because the island offers a natural protected harbor in the south against storms and bad weather. At the beginning of the century the island was sparsely populated with permanent settlement, but there seems to have been early trading and supply stations at the islands. Historical records show that fleets of up to 700 Chinese vessels applied to the French colonial state for permission to fish in Tonkin Bay during the monsoon and to use Cat Ba Island as basis for their fishing trips, in the first part of this century.

In 1979 all families of Chinese descent left the island and many Vietnamese also. This caused a total collapse of the fishing activities. An entire fishing co-operative from Cao Minh commune in Cat Hai District was moved to Cat Ba in 1979 to replace the Chinese fishermen that fled the country.

Co-operatives were started as early as 1958 in Cat Hai District. Our information about co-operatives is from the Cao Minh people who came in 1978 to Cat Ba Island. Before the time of co-operatives, most of the fishermen's families were floating households (i.e. lived on the boats). When the co-operatives were established co-operative houses were built in Cat Hai (Cao Minh village/commune) where the children lived, and went to school. Many adults seem to continuously live on their small boats also during the co-operative times, and use the boat for fishing and for household consumption.

There were four co-operatives in the Cat Hai district, with 50 vessels, between 30 and 250 hp. The fishing households of Chinese descent were important in the co-operative, as they were often the ones who were most capable both in fishing and in managing the larger vessels. It is estimated that before 1978 ca. 10,000 people of Chinese descent lived in Cat Hai District, and most of them on the Cat Ba Island. It was estimated that 60% of the population in Cat Ba before 1978 were of Chinese descent.

When the households of Chinese descent left in 1979, as well as many of Vietnamese descent, the co-operatives as well as the fisheries collapsed. It is estimated that the Cat

Ba fisheries was ca. 15,000 tons/year before 1978, and this is more than the total volume of landed catch in Hai Phong province in the late 1990s.

The co-operative was re-established in Cat Ba in 1978 when the Cao Minh people arrived, - and it continued up to 1993 when it was dissolved. It is the People's Committee that takes the decision to dissolve a co-operative. In the early 1990s the co-operative, Cao Minh Co-operative No. 2 had five vessels, 3x90 hp, and 2x110 hp. The boats were sold out of the district, and is now mostly in use as transport boats. The income from the sale of the boats was used to pay back credit to the state.

Also during the time of the co-operative the system of management of production underwent considerable changes. A system of contracting out of production quotas was established as early as 1982 and lasted until the dissolving of the co-operative.

Today private tourism is well developed on the island, as well as services for the fisheries and fishing trade.

HOUSEHOLD ADAPTATIONS: Families usually are involved in multiple income strategies, taking part in the services and trade at the fishing port, or in the tourism trade. From the information we received from the fishing households aquaculture in Cat Ba is mainly the cage culture build below floating houses for fattening of high value fish species for the Chinese market. Although poor people also try to invest in cage culture, it is typically the activities of medium and large-scale middlemen. This is so because it is perceived as a risky business locally as there has been failures in cage culture resulting from changes in salinity in the water due to heavy rains and changes in the monsoon.

Do Son Town – Ngoc Hai Urban Quarter

Do Son was the only place in the province with a natural harbor in older time when Cat Ba Island belonged to Quang Ninh province. While most of the other fishing communities in Hai Phong province are located along the rivers and in the estuaries, Do Son has long been the home of larger fishing boats that went further out from the coast to fish, also in the 30s and 40s.

Do Son is situated close to Hai Phong City, and has strong links with the city in much of its activities. It has long been a sea resort for middle class families from Hai Phong and Hanoi, also before 1954. After the Doi Moi tourist facilities in Do Son developed very fast. There are several beaches and a number of hotels and restaurants. The land is still owned by the state, and there has not been any issuing of land user rights to private people. The hotels are mostly been built by different public bodies, like ministries, state companies etc. Most of the tourist coming to Do Son are Vietnamese tourist who come from Hanoi and Hai Phong during the summer vacation when temperature is high. But there are also groups of tourists from China and other Asian countries coming, and much effort is made to attract more Asian tourists.

The community is therefore not very dependent on fisheries, but still has a strong identity linked to its past as a fishing community. There are strong traditions for fishing, shipbuilding and fish sauce production in the community. The co-operatives in Do Son were famous for their management and good performance, i.e. 'model co-operatives'. Do Son is an important place of investment in land development and

tourist facilities, and the links to Hai Phong City and the provincial administration seem strong.

One new area of investment is in aquaculture where the local government have been eager to support activities in this area. Most of the production from aquaculture is for the Chinese market, with very little production for the local (tourist) market. The annual production from catch fisheries in Do Son is 2000 tons. The annual production has been decreasing, but income is compensated by more valuable species in the catches.

Ngoc Hai was the only place we visited where the number of boats was declining. The number of wooden vessels were reduced from 80 to 38 vessels from 1997 to the end of 1998.This was due to poor people leaving fishing and moving to other economic activities mostly in the informal economy, or in the services linked to the tourist industry in Do Son. The high number of people leaving the fisheries is due to declining resource situation, according to the people we interviewed. It seems that the resource situation has been declining especially in the shoreline and near coast area, as fishermen moving further out with their boats to a less degree complained that the resources were declining.

Do Son has been the home of well-known fishing *co-operatives*. The co-operatives were started in 1958, as smaller fishing producer groups. In 1962 these were merged into one large co-operative, and this system lasted throughout the war. In 1977 the large co-operative split into smaller co-operative, each with 20 vessels. The late 1970s were a difficult time, and small scale contracting out already took place in the late 1970s. In the early 1980s the system of contracting out was formalised and implemented in Do Son (illegally), actually some time before Resolution No. 10 as proclaimed in 1982.

In the early 80s the co-operative still carried all the cost of production, vessel, petrol, gear and other input. What was contracted out was a production quota. The household was allocated a production (catch) quota of fish, which they had to supply the co-operative with. Whatever they were able to catch above the quota they could sell on the local market, and make extra income in addition to rudimentary supplies of basic foodstuff from the co-operative.

HOUSEHOLD ADAPTATIONS: Do Son was the only case we found were the number of fishing vessels was declining. This indicate an exit of fishing families from the sector, which is likely given the many opportunities that exist in the urban area of Do Son and Hai Phong. However, it is likely that many of the people leaving the fisheries are returnees from the refugee camps in Hong Kong that were given preferential credit to purchase vessel and gear, but who did not have the necessary skills to pursue fishing. Many of the families investing in larger vessels receive remittance from overseas family members.

Nghe An Province

Nghe An province is one of the poorest coastal provinces in Vietnam. It has few estuaries, where fishing communities historically have been settled, and the barren coast are vulnerable and prone to bad weather, storms and typhoons for several months a year. Nghe An is a famous province for political reasons, it is the birthplace

for Ho Chi Minh as well as many other high level members in the Communist Party of Vietnam. The province was also the scene for the emergence of the Soviets in the 1930s and its cruel subjugation by the French colonial military forces (Scott 1975). In Nghe An we conducted fieldwork in two communes, Nghi Hai commune in Cua Lo Town in the southern part of the province and Quynh Phuong commune to the north.

Cua Lo Town, Nghi Hai Commune

Fishery activities dominate in Nghi Hai commune, with tourist investment in neighboring communes in Cua Lo Town. A somewhat unique aspect in the labor market in Cua Lo is that there is a steady labor migration to South Korea. A labor recruitment office exist (we were told that it is of South Korean origin) that recruit young women to the textile industry and young men mainly to the South Korean offshore fisheries. There exist therefore a 'second' opportunity to get access to capital for family fishing boats, and we were told that many young men went repeatedly to South Korea to earn money for later investment in family boats.

Several production groups, i.e. low-level *co-operatives* were established in 1959. These were merged to one big multipurpose collective as late as 1969. In 1979, in the midst of a deep economic crises in Vietnam the collective was dismantled and the lower level production co-operatives re-established, five of them related to fishing (including trading and processing) and four handicraft co-operatives. From 1981 the co-operatives were gradually reduces as more and more task became contracted out, and private household production became more important. In 1988 the co-operative transformed. They kept on only able-bodied men with good fishing skills.

The main co-operative, Hai Dong Co-operative, now has approximately 50 members and four boats, two of them were bought in 1995 and two in 1997, replacing older boats. Each boat function as an economic unit, the crewmembers are paid according to the income of their boat. Each boat contributes money for the running of the co-operative's administration, which consists of six office staff of whom two are women. The members were keen to show that the main difference between a co-operative and a limited company was the right of electing their own management, i.e. if they were not satisfied with their management people, and they could elect new ones. The turnover of members of the co-operative boats is very low. In general the boats of the co-operatives are larger with stronger motors than the boats owned privately. This means that the co-operative boats can go further off the coast, and travel to fishing grounds further away from Cua Lo. This might be more important now when the coastal resources are declining, and might explain the low turnover of co-operate boat members, as well as the stability of the co-operative.

In the Cua Lo Town there were four fishing co-operatives in the late 1980s. Besides the Hai Dong Co-operative, one was liquidated in 1990, another has declined to 20 members and is about to be dissolved, while a third, Hai Quang Co-operative, is a strong co-operative with about 50 members. In 1998 a new type of co-operative with 15 members was formed to apply for credit for offshore vessel, the outcome of the application has not come yet, so it is too early to say if the co-operative will remain.

The PC in the commune estimates co-operative boats carry out that 40% of fishing activities, the rest being carried out by private boats.

HOUSEHOLD ADAPTATIONS: Fishing family members migrate to South Korea to save money for investment in family fishing vessels. Fishing households intensify fishing activities, fishing for more days and longer trips. Co-operative membership remains popular, as the co-operative vessels are generally larger than private vessels, and can cover more fishing fields.

Quynh Phuong Commune

Quynh Phuong commune is one of five fishing communes in Quynh Luu District. These fishing communes are densely populated and have a periurban character. The fisheries have increased rapidly over the last 10-15 years.

Since the continental shelf is very narrow the coastal resources have always been limited outside the estuaries. This area therefore has a tradition for fishing boats to go far from the coast. To provide some sort of security the boats traditionally went in groups and were rather large boats with large sails, either with joint ownership or hired crew. All the older men we talked with had been fishing in group fishing before 1959, when co-operatives were established. The boats were then registered as co-operative boats, but we know little about how fishing practices or work operation changed in this period. Each of the five fishing communes had their own co-operative. Together they had 26 vessels, with 22-33 hp, each with 24-30 crewmembers, making a total of 650-750 fishermen. Comparatively there are now 1548 fishermen in the same area.

The economy of the co-operative was poor, and there were never enough boats and crew places for everyone who wanted to join the fisheries. The young generation therefore had to join the private fisheries. We met several men in their 30's who were never able to join a co-operative, but joined small family boats in the late 1970's, while the father continued as co-operative member until the co-operatives were dissolved in 1991. According to the People's Committee of the commune ca. 20% of the men were always outside the co-operatives and were working as private fishermen. Many members left the co-operative before they all five were dissolved in 1991. This is actually quite late, as most co-operatives dissolved in the late 80's. After the demise of the co-operative many boat owners have returned to group fishing. Young men earn their income as crewmembers, and try to save money to buy their own boats, or part ownership of boats.

Today there are one or two co-operatives of the new type in all five communes. In Quynh Phuong there are two new co-operatives. The system worked like this: The commune was allocated credits for two offshore vessels. At a meeting in the People's Committee it was voted over who should get the credit. A man known for his skill as a captain and fisherman, and wealthy enough to know how to handle credits was selected to get one of the credits. Formally only co-operatives of the new type might be eligible for credits. A co-operative was therefore founded, but when we met the captain he claimed that he and his wife who did the books for the 'co-operative' were the only co-operative members, while the rest were only crew members, with no responsibility for the credit, neither had they put up any collateral. The 'co-operative ' was a de facto private operation, but established with political blessings.

HOUSEHOLD ADAPTATIONS: This is a highly fishery dependent community, with little access to other economic activities. There are some attempts to develop

aquaculture, but these are still very limited. Women engage in fishing trade, and local fish processing. Vietnamese Women's Union and women in the fishing households were complaining about lack of employment activities for women, and there seems to be serious underemployment of female labor. Educational level is very low, and malnutrition among the children is defined as a problem by the VWU.

Some Comments on the Social Differentiation Processes in the Fisheries

The general impression is that the living standards have greatly improved over the last 10-15 years. The income of the fishing households seems to follow two (three) different development patterns:

The first trend is households with declining income, moving out of fisheries. Many of these households are former refugees who returned to Vietnam in the early 1990s with subsidies to re-establish themselves as fishermen or in other economic activities. Many of them had been poor fishing households before, many of them living on the boats. Now the repatriation funds as well as credit were invested in boats, engine and gears. But the households often lacked the necessary competence, and a number of them have left fisheries. Although we did not get much information on this topic, we believe this might be the trend for other poor fishing households also.

The second trend is the households that are able to gradually expand the number and size of boat and gear. These are households that went into private fishing in the 80s, and were able to replace their vessel and gear with gradually larger ones every 3 to 4 years. At Ngoc Hai we also met people who had invested in two boats, and either made use of relatives or hired labor from other provinces as crew. The advantage with hired labor from other provinces was that they slept in the boat, and that the boat owner therefore also got watchmen or guards for their boats.

A third trend, which we presume will be there and which has been present in the other cases were the households with a poor but stable situation, and who were able to replace their vessel and gear with the same boat size as before. If near shore resources were declining, this group would easily be very vulnerable.

Impacts

- *Increased access and effort*

  There is agreement from all stakeholders in the Vietnamese fisheries that the effects of the changes over the last 20 years are a tremendous increase in access and efforts. This statement is backed up by national and provincial departments of fishery development and of marine resource protection. Fishermen in both marginal and central fishing areas repeatedly say it. They all would like to see the number of fishermen decline, and the most destructive fishing practices stopped. None of the fishermen however think this will happen, mainly due to the lack of alternative employment. Instead they all expect more entries to the fishing sector as the population increases. It is still common to have 6-8 children in the fishing villages.

  Another reason given for not expecting any more strict management systems, is the lack of government capacity, the high level of corruption and the

inability of the (provincial) government to carry out policies which would meet with strong opposition from local communities.

- *Resource management: will ecological or economic sustainability influence management options and change?*

  Current thinking in mainstream is that modern fishery management should be based on bio-economical models based on MSY and TAC. Biological data, i.e. stock assessments are supposed to give the data necessary for modern management instruments, quotas or other that will give the best resource use over time, i.e. sustainable harvesting securing the regeneration of stock and long time maximum harvesting. This model implies that the government who is the "sole owner of the stock open, i.e. common pool resources", uses its authority to intervene in the livelihood strategies of families and communities and impose regulations/restriction on their actions based on "better knowledge/science based model". However, in real world management there are usual or often some kind of politically based dialogue and settlement between government and fishermen's associations.

- *Economic sustainability*

  Because such data are hard to get and much uncertainty surround such data, some researchers question the ability of the scientists to come up with reliable data on tropical multi-species stock assessment. However, they claim that unless activities are heavily subsidised (and if there are other economic activities to be pursued), the fishermen will end fishing activities when the economic gain is below a certain level. In other words the fishing activities will cease when the fisheries are no longer economic sustainable, i.e. capable of rendering a sufficient return on invested capital, and this will happen long before the stock is reduced to a level where it can no longer be regenerated.

The motorization of the fleet and the difficulties that the boat owners of central Vietnam have in obtaining reliable and competent crew, does render the economic sustainable argument some validity. The cost of fuel, no longer subsidised, and the demand for income from crew, forces the boat owners to consider whether they will take the vessel to the fishing ground or stay at home.

There are however in the current situation two factor that mitigate against the economic sustainable argument:

1. The credit system is fraught with irregularities; in the offshore program most boat owners are not able to pay back the loan. The bank system seems to be lenient toward non-payers, and few boat owners are forced to sell their boats, although there are tales about that in Central Vietnam. With a well functioning credit system, the economic sustainable argument will be more valid.
2. In household-based fishing activities where the whole family participates, with vessels with small motors, the cost of going fishing remains low. Therefore the fishing activities might continue well beyond any return on capital invested, i.e. it might continue as long as the fisheries provide some food supply and income opportunities, for example selling surplus catch to their non-fishing neighbors. In such cases the fisheries might actually continue until the stock is depleted beyond

the opportunity of regeneration. In itself this argument is a difficult one to test, as tropical multi-species fish stock regenerate quickly, and where little is known about the interaction between the different species.

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Future working papers from the NIBR project "Vietnamese fisheries in the 1990s" to be published Autumn 2000 (preliminary titles):

E. Eythorsson and B. Aasen, Fisheries in Quang Ninh province.

B. Aasen and E. Eythorsson, Fisheries in Hai Phong province.

S. Eikeland and B. Aasen, Fisheries in Nghe An province.

B. Aasen, S. Eikeland and S. Skålnes, Fisheries in Khanh Hoa province.

J. Sundet, S. Eikeland and E. Eythorsson, Science, resource assessment and fishery management in Vietnam.

Appendix: Characteristics of the 6 case studies from the Northern-Vietnam

Topic	Quang Ninh province		Hai Phong province		Nghe An province	
	Ha Long City Hung Tang commune	Ha Long City Tuan Chau commune	Cat Hai district and	Do Son Town Ngoc Hai Urban Quarter	Cua Lo Town Nghi Hai commune	Quynh Luu district Quynh Phong commune
Community	Floating villages (van chai)	Model commune New co-operative Offshore fishing	Floating market Chinese exodus	Model co-operatives Old fishing center	Old fishing villages	High dependence on fisheries
Other source of income	None (no impact from tourism in Halong Bay)	Very few (no impact from tourism in Halong Bay)	Fishery service Tourism (private)	Tourism (public)	Tourism (public)	Very few
Cooperatives	Dissolved in 1982, did never function	Model co-op New co-op for offshore credit	Co-op transferred form Cat Hai in 1979. Dissolved in 1985	Model co-op from 1958. One co-op survived, the rest dissolved 1982-87	The co-op transformed to new co-op, i.e. now group fishing with members of co-op boats	Old co-op dissolved in 1991 Two new co-ops for offshore credit (de facto private (?))
Organization of production	HH, family/kin based	New co-operative	HH, group fishing	HH, group fishing	HH, group fishing Hired crew	HH, group fishing hired crew
Gender/ women	Whole family goes fishing, incl. women	Women lost income opportunities, stay at home when men go offshore fishing	Fish processing and trading, tourism and services. Some women go fishing in family boats	Fish processing and trading, tourism and services.	Fish processing and trading, tourism and services.	Fish processing and trading. Severe lack of income opportunities
Poverty	Severe poverty, few children go to school	Medium income, most children complete 7 years of school	Great variations, Pockets of poverty, but many income opportunities, because of varied economy	Great variations, Pockets of poverty, but many income opportunities, because of varied economy and close proximity to Haiphong City	Variations, pockets of poverty. Labor migration to South Korea by both young men and women	High level of poverty, low school attendance, and few years in school, malnutrition

Reproduction of fisheries	Stagnation, exit (?) What will happen to next generation? No access to credit (?)	Special preferential treatment as model commune	Differentiation: Exit (?) Stagnation. Upward mobility.	Differentiation: Exit (?) Or upward mobility. Remittance.	Labor migration to South Korea. Investment in family boats, upward mobility	Crew investment to invest in family boat. Or exit (?)

Coastal Aquaculture: Searching for Sustainable Management Strategies Case studies in the North and North Central of Vietnam

By
Mr. Tran Van Nhuong
Research institute for aquaculture No1
Dinh Bang, Tien Son Bac Ninh
Email: ria1@hn.vnn.vn
Phone: 84-4-8271368 Fax: 84-4-8273070

For sustainable development, controversial coastal aquaculture needs to be understood clearly and carefully. The author would highly acknowledge and would like to receive comments and suggestions from readers.

Introduction

Coastal Aquaculture could benefit developing countries through job creation, income contribution and foreing exchange earnings. However, in recent years, some models of coastal aquaculture have caused negative socio-economic and environmental impacts on local communities threatening sustainable aquaculture development. Aquaculture in Viet Nam has slowly developed and faced similar worldwide negative impacts: The breakdown in shrimp and fish diseases during the year 1993-1994 in the Mekong river delta, mangrove deforestration for shrimp ponds destroyed coastal ecosystem. In Northern and North Central region, Aquaculture are taking its first steps and is strongly supported by the Government and local authorities to meet economic development and poverty alleviation.

In exploring approach for sustainable aquaculture development, The research Institute for Aquaculture No.1 has carried out the study titled: "Towards identifying strategies for sustainable aquaculture management" in some representative sites of Northern (Hai Phong) and North Central (Nghe An and Quang Binh) from September 1999 to December 1999 with the coordination, financial and technical assistance of NACA/WB. In each province one district is selected and then one commune of the district is selected for the study. In Hai Phong, the study focused on DoSon district and BangLa commune, In Nghe an, Quynh Luu district and Quynh Bang commune and Quang Trach, Quang Thuan in Quang Binh are also selected respectively. The research has interdisciplinary contents with a very wide scope and focuses on brackish water aquaculture. Information and data for the research were systematically collected through group discussions with local communities at all levels (province, district, commune and farming household, aquaculture household) and also through interviewing aquaculture households with a standardized questionnaire. This paper presents the opportunities and challenges for aquaculture for poverty alleviation extracted from the study.

Major Findings and Discussion

The brackish water aquaculture system

Table 1 showed some figures on brackish water aquaculture systems in Bang La, Quynh Bang and Quang Thuan communes:

Table 1: Some economic and technical figures in the research sites

Figure	Bang La	Quang Thuan	Quynh Bang
Pond Square (ha)	0.174 (36)	1.091 9230	1.016 ** (32)
Culturing species Mud Crab (one/m2) Tiger shrimp Fish	 1.4 (36) 2 (23) -	 3.3 (28) 2.9 (12) -	 1.3 (32) 1(15) No data (17)
Main investment	Industrial feed, trash fish, shrimp, organic and inorganic manure	Trash fish, organic manure and industrial feed	Industrial feed, organic and inorganic manure
Productivity (t/ha) Tiger shrimp Mud Crab	 227 (27) 1.022 (36)	 154 (12) 245 (23)	 168 (32) 33 (2)
Economic analysis / ha Invariable cost Variable cost Revenue/year Gross margin Gross profit*	 6,090,000 48,082,000 97,230,000 49,148,000 43,058,000	 3,098,000 15,296,000 27,912,000 12,616,000 9,518,000	 1,948,000 4,403,000 23,950,000 19,547,000 17,599,000

* Gross profit including household labour

** Collective ponds in Quynh Bang are distributed to household with large water surfaces

Commonly there are 2 culturing seasons in a year tiger shrimp culture at first and crab culture for the second. In general, aquaculture in the research sites is just household production with small scale of extensive or improved extensive culture little invested bringing low productivity and economic value. The most common feed in Quynh Bang and Quang Thuan is trash fish or small shrimp collected from natural in Bang La, Do Son, Industrial feed is often uncommonly used at the beginning of the culture seasons with very low level. Economic analyses show that the investment of farmer to aquaculture is still low and rather differentiates from each culture region. In Bang La the cost for culturing is much higher even variable and invariable cost. However, if the average productivity is 1,000 crab/season, Bang La ranks a semi-extensive commune with low productivity.

Contribution of Coastal Aquaculture to Poverty Alleviation

Results of discussions at all level showed that aquaculture plays a very important role in creating jobs, increasing income and improving nutrition conditions for local people. For example, contribution of aquaculture in Hai Phong province was around 100 billion/ per year creating jobs for 3,500-4,000 households, of whom 13,000 direct labourers and 5,000 indirect labourers. In Quang Binh, aquaculture attracted 20,000 households of whom 1,000 household participating in brackish water aquaculture.

The contribution of aquaculture to poverty alleviation was explored at macro level in terms of livelihood opportunities and income contribution to local people.

In Do Son district of Hai Phong Province, main economic activities consist of tourism and service, agriculture, salt production and exploitation of aquaculture. Income from tourism and service is the highest in the share but only for a limited number of well-off households. Agriculture production faces to difficulties because of salty soil condition and lack of fresh water source. It is also the same to salt production due to low salt market price. In contrast, aquaculture created more jobs for labourers involved directly in aquaculture production and for labourers taking part in equaculture related activities such as feed, seed supply and trading aquaculture products. The two cases in Dŏson District showed below could provide implication of poverty alleviation via aquaculture at macrolevel.

Development of Do Son Aquaculture Company. The forerunner of Do Son Aquaculture Company is Trung Dung agricultural farm that involved in rice production, cattle breeding and freshwater fish culture. Since its establishment in 1984, farmers in the state farm have hard working conditions and low living standard, and the Trung Dung farm was threatened to be dismissed in early 1990. Then in the same year coming with NARV project of brackish water aquaculture planning and development, Trung Dung farm has located 120 ha of land for brackish water aquaculture. The farm allocated "long term" land use contract for farmers after finalising aquaculture plan, each farmer was received 1.3 ha of pond. In early years the stocking species are mud crabs, since 1994 tiger shrimp were experimentally cultured and widely multiplied. Up to 1998, the total cultured area of the company increased to 400 ha creating jobs for 107 former state farm households and 200 local households. Economic conditions of farming households are improved gradually. The company has accumulated and mobilized capital to reinvest to and re-plan infrastructure for culture. Farming households also accumulated production capital for reinvestment thus very few households had to borrow capital from state bank.

Aquaculture as a livelihood opportunity for peaple in Bang La. With 8,000 people, traditional economic activities of Bang La commune are handicraft and salt production. During the period of centrally planed economy, salt production and distribution were subsidized by the Government. After introducing economic reform, salt production in Bang La faced many difficulties due to mechanism of market economy, salt production in the central and the south has more comparative advantages. The area of salt production was reduced from 180 ha to 120 ha; many reservoirs, canals and ditches used for salt produce were left fallow. According to the communal statistic, the average income of Bang La commune is 1,200,000 VND/person/year. At the beginning of the 1990s, the coastal aquaculture development started. The local actively turned fallow surface of water such as reservoirs and ditches into aquaculture ponds. Because of higher benefits of aquaculture many salt producing households had converted into aquaculture production. In 1998, there were 1000 households in the commune directly joining in aquaculture and many job opportunities have been created for the poor such as collecting small molluses for selling to aquafarmers, digging ponds or gathering cultured products for bigger merchants. Results of group discussions with local people showed that living standard and communal economy as a whole have been improved since coastal aquaculture development.

Contribution of coastal aquaculture to poverty alleviation was also revealed in terms of land use options.

With saline land, aquaculture could produce higher income than any other agricultural activities. The survey conducted by Stastical Office in Hai Phong showed that income of aquahouseholds is three times higher than that of agricultural farmers. Households who have large aquaculture area could become rich if they get favourable production condition and good capability of farm management.

It is usually difficult to find economic development alternatives for coastal communities. Poverty is often accompanied with devastation of natural resources due to overexploitation of aquatic resources or mangrove forests. Non-government organizations in Vietnam have been focused on environmental rehabilitation along with promotion of aquaculture development. Research results in the Mekong Delta showed that Mangrove-aquaculture integration could produce good benefits for local communities (Binh and Phillips 1996).

The Poor' s Involvement in Coastal Aquaculture- Micro level

The above discussions showed that coastal aquaculture can produce wealth in poor coastal communities and in general, the poor's economic condition could be improved through promotion of rural economic development. However contribution of coastal aquaculture to poverty alleviation was only revealed when analyzing at macro level, role of coastal aquaculture in poverty alleviation is not clearly understood since there are few examples of aquaculture helps poor households move out of poverty.

Majority of coastal aquaculture farmers are currently the rich and medium. The poor are only indirect beneficiaries from coastal aquaculture. For example, the poor participated in aquacultreu as hired labours in pond digging, harvesting or collecting natural feed for aquaculture farmers. The poor participated in coastal aquaculture only when they receive support from government or from the rich as Vietnamese tradition charity "helping each other". For examples in Quang Thuan, after terminating the 773 aquaculture project, ponds were allocated to landless disabled veteran, returned soldiers or poor fishermen in coastal communities. Other example is in Quynh bang, aquaculture ponds are large, the rich incorporated the poor who have close relationship with them such as their relatives, best friends in their groups.

Unplanned aquaculture development may have negative impacts on the poor. For example, in Bang La commune, indiscriminate conversion of salt fields into aquaculture ponds caused significant loss to the poor relying on salt production. In areas which aquaculture ponds mixed with salt fields, salt productivity and quality was reduced due to poor water quality resulted from aquaculture wastes. Drying capability of salt field was also reduced due to permanent water seepage from aquaculture ponds. In addition, a land market has appeared and the rich are willing to buy the poor' s land, which could be vulnerable to the poor. Without governmental interventions, the poor will face difficulties resulted from coastal aquaculture development in Bang La.

Coastal Aquaculture as a Livelihood for the Poor

The poor in whatever production activities always face difficulties, though each type of the poor has its own characteristics. Results of group discussions with local farmers emphasized that the poor can operate aquaculture ponds only if they receive supports (mostly capital) from other agents as examples of the poor' s participation in coastal

aquaculture in Quang Thuan and Quynh Bang mentioned above. However, while encouraging the poor's participation in aquaculture, understanding and classification of poor groups should be taken into consideration, then base on the analysis, decision on encouragement of the poor' s involvement in aquaculture will be made. PRA discussions with local people in Hai Phong classified four types of the poor as the following:

- The poor with low labor capacity, and highly dependent people. These people should work as labourers for aquaculture such as collecting natural feed (molluscs) for aquaculture farmers.
- The poor who lack capital, with high labour capacity can work as hired labourers for aqua-farmers.
- The poor with high competence can work as small merchants, collecting aquaculture products for larger merchants.
- The poor with low competence, poor labour resource, disabled people, and old people should not be involved in aquaculture in any way.

Discussions with local people in Quang Binh revealed that extensive aquaculture could be a suitable occupation for the poor because it requires low capital investment. Increasing level of aquaculture intensification will increase the risk, therefore is vulnerable to the poor because capability of the poor to cope with risk is lower than the rich. In this case it is safer for the poor when they work as hired labours in aquaculture.

The probability of the poor' involvement in aquaculture in Quang Binh depends on types of the poor:

- The poor living on fishing can involve in extensive aquaculture with outside supports
- The poor living on agriculture usually cannot operate aquaculture pond because they lack of experience.

In Quynh Bang, Quynh Luu, Nghe An local people argued that in terms of technical know-how, everybody in Quynh Bang could join aquaculture because fishing is a traditional economic activity. However the poor involvement in any kind of aquaculture is constrained by aquaculture land scarcity.

Challenges for Poverty Alleviation via Coastal Aquaculture

Though coastal aquaculture offers a great potential for economic development in coastal areas, currently aquaculture contribution to poverty alleviation is low because there are some challenges such as lack of aquaculture and land use planning, lack of suitable farming technologies, disharmony in aquaculture management and underdevelopment of aquaculture supporting services and infrastructures.

- Aquaculture development is poorly planned, especially aquaculture land use allocation

Aquaculture planning has determinant effect on aquaculture contribution to poverty alleviation because planning will deal with land use allocation. Discussions with local

people implicated that the poor also want to take part in coastal aquaculture but they could not manage to get or reclaim land for aquaculture.

Coastal aquaculture lands may originate from the following sources:

- Aquaculture land may come from equal given land such as residential, garden.
- It may come from abandoned land in the coastal area with no clear land use system. This belongs to communal management. Aqua-farmers have to lease this land from the communal authority.
- With longer reclaimed land, the land management is clearer, the aqua-farmers have to contract with district authority (central government delegation).

Most aquaculture land came from abandoned land or communal land, which belongs to communal management. It was given to aqua-farmers followed bidding systems; the farmers who pay higher price will receive the land. The poor are usually out-competed in this land distribution process.

- *Lack of suitable farming technologies.*

Aquaculture is still risky that give few incentives for the poor to involve in coastal aquaculture. Appropriate coastal farming models have not developed and coastal aquaculture has a trend to simplify into tiger shrimp monoculture. In addition, there is high potential for outbreaks of aquatic animal diseases but there are no effective measures for coping with these problems.

Current research is mainly focused on biological and technological aspects of aquaculture, lack of socio-economic and ecosystem studies. Coastal aquaculture is new and complicated industry which need to study in a holistic perspective.

- *Ineffectiveness of extension activities to target the poor.*

Though extension officers have already offered some technical training courses to farmers, farmers technical level is still low and technical adoption is limited. Current extensive aquaculture systems have low efficiency and in some cases Provincial Extension System for Fisheries has not been established yet. Government budget for fisheries extension is very low. Aquaculture practices based entirely on traditional methods and experiences of farmers.

- *Limitations in aquaculture organisation and management.*

Aquaculture is new activity and currently contributed a small proportion of income to local communities compared to other sectors. Thus, local authorities have not realized the importance of aquaculture in poverty alleviation to strengthen and direct aquaculture management and development. This problem is clearly exposed during discussions with local officials, especially district and commune levels. There is usually a lack of staff with aquaculture background to advice local authorities in aquaculture development.

One of the key factors in sustainable aquaculture development is the control and management of seed quality quarantine. Though the Ministry of Fisheries has

delegated the responsibility of seed quality control to Department of Fisheries Resource Protection, it is difficult to implement management regulations due to lack of support from local authorities at grass root levels and even, of aquafarmers.
While seed supplied for coastal aquaculture in the North and North Central is mainly dependent on sources in the Central, weakness in management of seed production and quality control will increase risk of aquaculture because of disease outbreaks. As disease outbreaks the rich have higher capability to cope with it than the poor, this may be another reason why most of the poor currently participate in coastal aquaculture indirectly.

- Disharmony in government policies to support and promote coastal aquaculture development.

Objectives and general orientation of the central and local governments in coastal provinces is to promote semi-intensive coastal aquaculture, targeting it as a leading economic sector. In pursuing the aquaculture objectives, the Government has initiated a number of legal framework and policies, which favour coastal aquaculture development such as: land use policy, extension and credit policy. These favourable policy environments have given a momentum to aquaculture development. However, there is disharmony in implementing these policies.

The aquafarmers have low financial capacity meanwhile capital borrowed from government credit programmes is in small amount with complicated procedure. The Bank systems do not meet the farmers' demand because there is a lack of specific loaning procedures applied for coastal aquaculture.

Conclusions and Recommendations

Conclusions

Findings indicate that though coastal aquaculture in the study areas are in extensive and improved extensive modes with low inputs applied and low productivity gained in return, it has demonstrated great opportunities for improving livelihood options for coastal communities. By generating income and employment in coastal communities, living standards of coastal people including the poor could be improved through direct or indirect involvement in coastal aquaculture. However contribution to poverty alleviation has been challenged with some constraints such as weakness of institutions governing coastal aquaculture, lack of appropriate farming systems, and negative socio-economic and environmental impacts (disease outbreaks, pollution) are likely to increase due to poorly planned aquaculture development.

Recommendations

To direct coastal aquaculture for poverty alleviation, the central and local government should take strong responsibilities regulating the sector, in which land use and aquaculture planning should be critically reviewed, sound coastal farming systems should be developed together with harmonizing other supporting policies for coastal aquaculture and strengthening government and community institutions involved in aquaculture and coastal zone management.

Aquaculture in Quang Binh Province Aim at Poverty Alleviation

By
Hoang Dinh Yen
Director of Provincial Fisheries Department.

Introduction

Quang Binh is one of provinces in the northern central part of Vietnam which topography consists of upland, delta and coastal areas. The total area of the province is about 803,760 ha and there is a population of 797,000 people. Quang Binh is one of the poorest provinces in Vietnam with an average income around 2,200,000 VND/year (USD 157) and 26% of the families are considered as very poor families (figures from 1999).

With over 126 km coastline, 5 estuaries and a number of reservoirs and smaller lakes, Quang Binh has a great potential for aquaculture development. The estimated area for aquaculture is around 15,000 ha of which 4,000 ha is coastal aquaculture and 11,000 ha for freshwater aquaculture. In Quang Binh province, there are 7 districts including 2 districts in upland and 5 districts in coastal areas. The fishery sector produces about 17,000 tons of which aquaculture accounts for 1,450 tons in 1999 figures. In recent year over-fishing near shore and off shore has caused low productivity and efficiency, which again have led to decreased livelihood for fishermen. The provincial officers were told to lay down a policy for changing the professional frame, so there should a decrease in investments for fishing equipment in both near shore and off shore waters and instead increase the aquaculture development.

Thanks to the governments two programs namely 327 and 773 for poverty alleviation and development of aquaculture based on human resources, there has been some poverty alleviation for farmers.

At present, there is about 1,210 ha water surface area and 1,500 cages in rivers and lakes are used for aquaculture, which create employment and improved livelihood for nearly 5,000 people. Brackish water aquaculture contribute positively to solve difficulties and improving livelihood for poor farmer in coastal areas. Cages cultures in rivers participate in improving livelihood for poor household in upland areas. In addition, the development of clamp and marine fish cultures are important trends to further alleviate poverty for in Quang Binh province.

For aquaculture development, the provincial fishery department gives special attention to technology transfer through extension training, trial farms according to ecological areas, meeting, workshops for exchanging knowledge on new aquaculture techniques etc. There have been investments in hatcheries and this have lead to a gradually improvement of the fish and shrimp seed supply to the farmers. Furthermore research has been carried out on determining suitable species and suitable crop practices for the area.

However, aquaculture in Quang Binh is still undeveloped, compared with other provinces. The reasons for this are listed below:

- Undeveloped economy, poor farmers, lack of capital to invest for improving ponds, equipment for aquaculture.
- The educational level on aquaculture techniques is low and there is no easy access to information.
- The climatic conditions are unstable.
- There is an increasing threat from diseases to aquaculture.
- Planning and an organized system of aquaculture and extension activities still have difficulties and are limited.

Therefore, the best choice at present when establishing aquaculture is to select an improved extensive culture model and only apply semi-intensive culture models were areas with suitable conditions are available and prepare conditions for applying intensive culture techniques when economic conditions and the level of education and techniques are suitable in Quang Binh. With a relatively low investment, this policy has created a lot of employment and reached the objective to help poor farmers developing production and improving livelihood. It have also prepared to progress to a higher production level and at the same time maintain a sustainable aquaculture development.

The making of a sustainable aquaculture development program and a program aimed at resources protection and poverty alleviation for poor farmers in upland and coastal areas is pressing and a necessary requirement to meet the requirement of locality such as:

- Evaluation and planning of aquaculture areas and beneficiaries through local communities aimed at carrying out poverty alleviation.
- Transfer new technology through aquaculture training of farmers and extension workers in local areas, with assistance from institutes and universities.
- Through investment policies spread out aquaculture with the emphasis on poverty alleviation.
- Support the techniques, capital to preparing and improving the local seed hatcheries guarantee to take the initiative in quantity and quality seed. The erection of technique equipment serves aquaculture.
- Establish trial farms, organize workshops, spread and exchange new technology and carry out special subject activities to transfer knowledge to farmers.
- Activities in research and survey such as: survey on water environment, diseases and new species for culture can form the foundation for recommending more sustainable solutions.
- Establish investment projects for aquaculture development and resources protection of sensitive ecological areas to meet the poverty alleviation target.

Recommendations

- For Quang Binh province, brackish water aquaculture development can raise the income for farmer's who live in coastal areas, a numbers of poor people who live in upland districts should be interested in cages, fish-cum-rice culture development to attack poverty.

- A number of fishermen who live in the coastal areas have no access to land; means of production should be settled through the development of VAC systems and disseminate these ideas and principles to the farmers.
- Assist local authorities in consolidating extension networks and establish training centers and technology transfer through co-operation with universities, colleges and institutes to ensure a sustainable development of the sector.
- Request to build a national seed center in each province to make good quality fry and supply local hatcheries with shrimp and fish broodstock to guarantee an improved seed quality.

Poverty Alleviation and Marine Cage Culture in Khanh Hoa Province, Vietnam

By
Mr. Le Anh Tuan, Mr. Nguyen Trong Nho,Mr. Do Thi Hoa, and
Mr. Ta Khac Thuong
University of Fisheries, Nha Trang,
Khanh Hoa, Vietnam
and
John Hambrey
Econeco, Crancil Brae House, Strathpeffer, IV14 9AW,
adjunct faculty with AIT

Introduction

Applying the principles of sustainable development in practice in poor but rapidly developing countries is difficult and complex. In particular, rapid population growth leads to intense pressure on natural resources. Sustainable development strategies should alleviate poverty while at the same time reducing or minimizing environmental degradation.

Pressure on land and water resources in Vietnam is enormous. Only 0.13 ha of cultivated land is available per capita of the rural population. Population growth is around 2%. The government has strongly encouraged increased agricultural production, mainly through intensification. For example, rice production grew from 16 to 24 million MT between 1985 and 1995 (FAO 1996), allowing Vietnam to shift from being a major importer, to being a major exporter of rice. Per capita income is still low however, with a national average below USD 300 pa and as low as USD 100 pa in the poorest districts. National and provincial development plans therefore increasingly emphasize diversification and increased income. How can this be achieved without further habitat destruction and environmental degradation?

Fisheries and aquaculture are obvious candidates in a country with more than 1,000 miles of coastline and extensive estuarine and intertidal systems. A DFID funded research project was begun early in 1998 whose purpose is to develop sustained small-scale cage fish culture in inland and coastal waters. The project consists of a Bangladesh component focusing on inland waters, and a Vietnam component, which focuses on marine cage culture in Khanh Hoa Province. This paper briefly describes the latter.

Major Issues and Research Focus

Tropical marine cage culture is attracting increased attention, partly related to the search for alternatives to shrimp culture. Relatively small-scale and limited production has been underway for many years in Vietnam, based mainly on the fattening of wild seed of various grouper species, and lobster. Production takes place mainly in simple hanging net cages, stocked with wild caught seed, and fed with "trash" fish (Trai & Hambrey 1998). Harvested fish are sold mainly to export markets such as Hong Kong and Taiwan, though there is modest local demand for the restaurant trade. The price of grouper is relatively high averaging USD 7-8/kg farm gate price.

Five basic questions are being addressed in the research:

1. Is the supply of seed sustainable, and is it sufficient to support a significant industry? What are the alternatives?
2. Is the supply of "trash fish" adequate and sustainable (in terms of sustained yield from the fishery)? What are the alternatives?
3. Does the use of "trash fish" as an aquaculture feed affect the price or availability of low cost nutritious fish for human consumption?
4. Which (if any) of the various options for marine cage culture is most suited to poverty alleviation, in terms of risk, investment, resource and financial characteristics?
5. What are the institutional and economic constraints to, and opportunities for, marine cage culture?

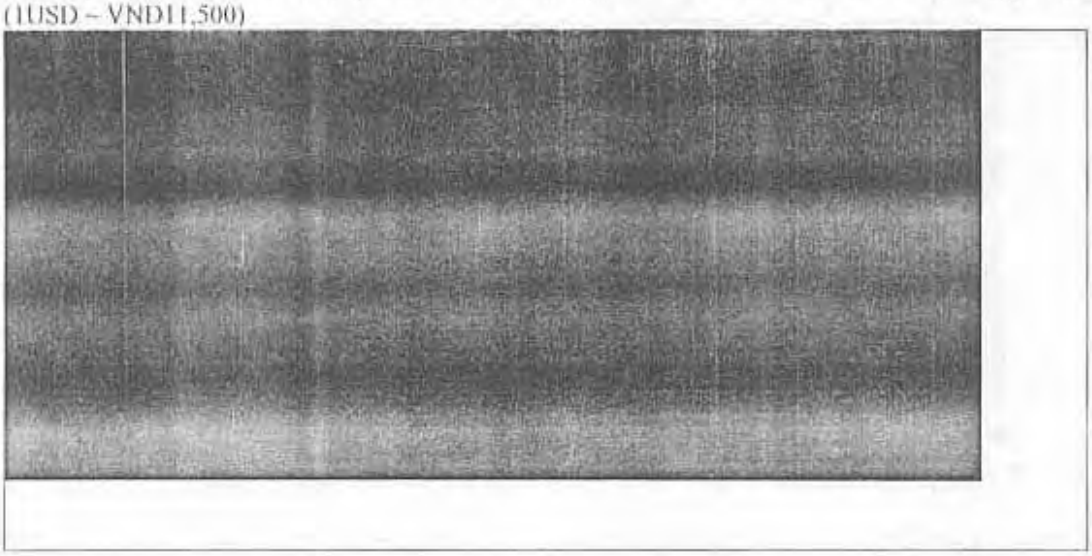
Practical output from the research will include guidelines for planning and extension of small-scale marine cage aquaculture.

Sustainability of seed supply

A field study was conducted in early 1998 based on assimilation of existing information, questionnaire survey of fishermen, and catch area ecological survey, to identify the present status and future potential of grouper seed supply, from ecological, technical, and socio-economic perspectives. This work formed the basis for a Masters thesis from AIT (Tuan 1998).

There were six "black grouper" species collected: *Epinephelus akaara, E. malabaricus, E. coioides, E. merra, E. sexfasciatus, E. bleekeri* and one "red grouper" *Cephalopholis miniata* which were temporarily held for export. Seed production from these areas was positively correlated with sea grass cover for all species. In the case of *E. coioides* and *E. merra*, seagrass explained 94% of the variation in production, but less in other species. Production in all species was negatively correlated with both depth and salinity. No clear relationship was found with mangrove. However, migratory movements complicate the spatial relationships. According to fishermen, grouper seed, and in particular *E. malabaricus*, migrates from estuary to lagoon to coral reef during the period January to August.

Figure 1: Price Trends for Grouper Seed in Khanh Hoa Province Vietnam (Trai and Hambrey 1988) (1USD ~ VND11,500)



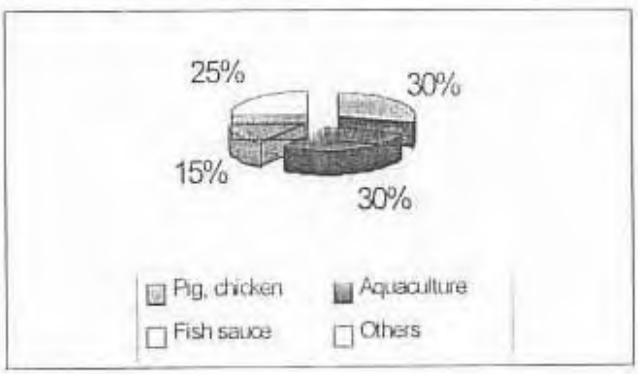
Total grouper seed production in Khanh Hoa was approximately 200,000 pieces per year, sufficient to meet local demand in the short term, but insufficient to allow for further expansion of the industry. Knowledge of the fishery is inadequate to be able to determine maximum sustainable yield, and this information is unlikely to be available in time to be useful for management purposes. However, price gives a reasonable indication of the relation between supply and demand, and this has increased significantly in recent years for all sizes of fish, suggesting a shortage of supply and the possibility of over-exploitation (Figure 1).

Consumption and Supply of "Trash Fish"

The Market for "Trash Fish"

Aquaculture has become a significant local consumer of trash fish, accounting for 30% of landings the balance being used for pig and chicken feed (30%), fish sauce (15%) and a variety of other uses (25%) including human consumption, especially for the poor (Figure 2). Anchovy is the favored species used for fish sauce. Most trash fish species cost around VND3,000 per kg (~ USD 0.25/kg).

Figure 2: Destination of "trash fish"



Historic price and quantity data is now being examined to try to determine the impact that demand for trash fish for aquaculture has on price of the different component species/size/quality groups, and in particular its impact on the price of fish used for

human consumption. This is difficult, and additional funds are therefore being sought to explore these relationships in more detail.

Diet Composition

Lobsters are fed exclusively with fresh whole or chopped fish and shellfish. The most commonly used species/groups for feeding lobster are Lizard fish (*Saurida* spp); Cardinal fish (*Apogon* spp); Pony fish (*Leiognathus* spp); pomfret; snails, oyster and cockles; small swimming crab, other crabs and shrimp. Finfish comprizes about 70% of the diet, with 30% shellfish. The preferred fish (comprising 38% of fishes in diet) was lizard fish.

Farmers showed active selection of the preferred fish species, using a consistently higher proportion than present in typical trash fish landings, and using a higher proportion of lizard fish in particular, despite significantly higher price (average VND 5,000/kg) associated with this species.

Food conversion ratio for lobster using this diet is high at around 28-30:1 (fresh weight basis). Expressed on a dry weight basis, this equates to a value of about 6:1 (Williams 2000).

Regarding grouper, the food conversion ratio is 4.3:1 and 5.9:1 for pond and cage culture respectively (Trai and Hambrey 1998) and from 4:1 to 17:1 (Tuan et al. 2000). Data compiled by the Cam Ranh District Office for Agriculture indicated that the FCR of pond-cultured grouper fed trash fish averaged 7.3:1. If 80% moisture content is assumed for the trash fish, the FCR, expressed on a dry matter (DM) basis, ranges from 0.8:1 to 3.4:1(Williams 2000). Feed costs comprise around 18% of the farm gate price of grouper.

Technical options

A range of existing and possible future options for marine cage culture is being explored in terms of their sustainability and suitability for poverty alleviation. The options include:

- Grouper culture (wild seed)
- Lobster culture (wild seed)
- Seabass culture (requiring hatchery development)
- Siganid (rabbit fish) culture (wild or hatchery seed)
- Seahorse culture (hatchery seed)
- Red sea-bream (wild seed; hatchery seed)
- Yellowtail (wild seed)
- Milkfish (hatchery seed)

These options will be assessed against the following criteria:

- Financial return (on investment; to labor)
- Long term market potential
- Economic return (to the province and country)
- Comparative advantage
- Employment creation

- Resource use efficiency
- Accessibility to/suitability for the poor,

  -Skill requirements
  -Investment requirements
  -Resource requirements
  -Economies of scale
  -Risk profile

This on-going assessment is desk based, using information and data collected during the research, both locally and in the literature, coupled with participatory exercises to bring a more local and practical perspective to the issues of technology choice.

Socio-economic Issues

Socio-economic issues are also being addressed through rapid rural appraisal, social survey (44 rural coastal households), participatory rural appraisal (17 villages in 4 coastal districts). Approach and techniques were based mainly on those described by Pido et al. (1996), Theis and Grady (1991), and Townsley (1996).

The Coastal People

Families who live closer to the city are generally richer than those who live far away. Most families are relatively young with household heads in their 40's and family size around 6. Usually two family members are involved in some form of active labor. Educational level is generally low, usually finishing at primary or junior high school levels. Main occupations are fishing, agriculture (crops, livestock and poultry) and aquaculture. Other occupations include trade, tailor and charcoal production. Most households (71%) have subsidiary as well as main occupations. Fishing households were least likely to have subsidiary occupations. Occupational structures vary significantly between villages according to location, natural resources, skills and traditions.

Labor Availability

The survey showed that the active workers in each household generally had significant free time (for example between tides in the case of coastal fishermen) available for new enterprises. The total available labor of one family was determined according to the guidelines presented elsewhere (Christensen 1989). Each household used approximately 58-87% of its total man-days (320-550 MDs in comparison to 420-790 MDs).

Income and Savings

The per capita income of the 44 households surveyed averaged less than $200 pa, and in some cases was as low as USD 36 pa, significantly lower than the provincial average of USD 300 pa. Income was spent primarily on food (60%) and production expenditures (27%). A small proportion was spent on child education (9%) and "shopping" (5%) all figures being mean values from the survey.

Development Objectives

The objectives and aspirations of villagers in terms of development generally, and the possible role of aquaculture, were discussed and ranked. The main ones, ranked in overall order of importance, were:

- Create more jobs
- Diversify occupations
- Create more profits than in agriculture
- Make complete use of water resources

There were some differences between villages in terms of ranks assigned to these objectives. In particular the villages in one district ranked " create more profits" as the top priority.

Natural Constraints to Aquaculture Development

The natural constraints to aquaculture development are fairly self evident, and related to access to, and control of suitable sites. Other than Nha Trang city itself (which has the greatest number of suitable sites) this was rated as the major "natural" constraint. Natural disasters (such as flood and storm) were also rated as a possible constraint. Pollution was also mentioned, but ranked lower than the others in most districts.

Financial Constraints to Aquaculture Development

In all villages, shortage of investment capital was identified as the main constraint to involvement in aquaculture development. Other important issues were the difficulty of choosing a profitable enterprise, and difficulties with credit, related to loan periods and high interest rates. Although bank loans were offered at relatively low rates in some villages, they were often not available to the poor. Poor or inefficient utilization of existing cash resources within the village was also considered to be a problem, but was ranked below the other constraints.

Requirements for Marine Cage Culture Development

The following, ranked in overall order of importance, were considered by the villagers to be requirements or pre-conditions for marine cage development:

- Money
- Technology
- Access or rights to suitable water areas
- Appropriate policies

This ranking was common to all villages except for one, in which the last two were reversed.

Institutional Issues

These are currently being addressed "from above" using relatively formal analysis of institutional roles, structures, procedures; informally through workshops involving the main institutional "stakeholders"; and "from below" through participatory sessions with rural community to address strengths and weaknesses of existing development interventions.

There have been many advantages for the national economy development in general, and the marine cage culture development in particular since the "Open Door" policy was initiated in 1986 by the Vietnamese Communist Party. However, at local government level, there were some constraints as follows:

- Department of Fisheries (DOF) has not enough power to manage all issues related to the development of aquaculture and fisheries in its province. DOF is not the final decision-maker. It works as a consultancy unit for the Provincial People's Committee. Its documents sent to districts are not mandatory but only recommendations.

- At district level, there is no fishery office. Only one person in agriculture office is responsible for fisheries. Therefore, there is a shortage of manpower to implement DOF's plans at district and commune levels.

Preliminary Conclusions

Cage culture of marine lobsters and finfish in Khanh Hoa province is profitable, and can be undertaken on a small scale. To date it has suffered few disease problems. It therefore has clear potential for the generation of increased income to poor local people. The major constraints to further development at the present time appear to be:

- High cost and probable inadequate supply of wild seed
- Lack of access to low interest capital
- Apparent lack of access to suitable sites in the case of some poor villages

Trash fish for feeding is still in plentiful supply, but the long-term sustainability of exclusive use of this resource for feeding is questionable, especially in the case of lobster, which exhibits a low food conversion ratio. Alternatives such as mixed or formulated diets, or the use of non-carnivorous species will be explored and compared with existing activities against a range of economic and environmental criteria.

The current supply of wild seed may be neither adequate nor sustainable for the future development of the industry, and either improved coastal resource management, and/or alternative supply from hatchery production would be needed in the long term.

Although hatchery production of grouper seed is possible, and appears to be financially viable on paper, it is difficult and risky, and would require significant investment alongside a coordinated development program. A possible easier alternative is seabass (*Lates calcarifer*), which is now routinely produced in hatcheries in Thailand. A general feasibility study is now underway to assess the viability of this option.

However, the study demonstrates clearly that any technical research or extension will need to be balanced with broader social and economic development initiatives if the potential benefits of marine cage culture are to made accessible to the poor.

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Capacity Building in Marine Aquaculture

By
Dr. Tran Mai Thien,
Director of Research Institute for Aquaculture No.1
and
Mr. Niels Svennevig,
Head of Int. Projects Dept., SINTEF Fisheries and Aquaculture
N-7465 Trondheim, Norway.
e-mail: niels@svennevig.dk

Introduction

This paper presents the activities of the "Building of Advance Research and Education Capacity of RIA1", a 3-year NORAD co-financed project with a total budget of about USD 3 million (Government 1.3 mill. and NORAD 1.7 mill.). Focus in this paper is given the coastal and marine components and their implications in poverty alleviation and improvement of livelihoods. Also the paper addresses some of the common perceptions held in the role of marine aquaculture in poverty alleviation.

Background

The fisheries sector in Vietnam is considered as one of the five most important economic sectors. Though only contributing by about 6% to the Gross Domestic Product, the export earnings from the sector account for nearly USD 1 billion and they were second only to the oil industry. The aquaculture production growing at an annual rate of 5-10% during the last decade, contributes with about 550,000 tons, which are about 50% of Vietnams total fishery production.

The aquaculture structure in Vietnam differs from most other countries in the region by basically consisting of only small-scale family-operated farms. Very few companies run large-scale farms are operating in Vietnam and even within shrimp production; farms are family run activities holding in average 2-3 ha.

In development or aid policies there is often seen a perception of two main modes of production namely the subsistence and the market demand productions. The subsistence production includes farming of freshwater fish while the market demand production includes seaweed, shrimp, clams and cockles and marine fish in brackish and marine water areas. Likewise the perception is often that the subsistence production is more sustainable – more suitable than the other. But the grouping into production modes and perception of sustainability however is too simplified, as it does not pay enough attention to the "development maturity" of the productions.

Also it is too simple to view production of freshwater fish as targeting the immediate subsistence needs of increasing the nutritional level within the local farmer-household. The households will, whenever it is possible, use the production to increase their income generation by selling the production on the market. Therefore the differentiation in production modes is often artificial. There is one common driving force irrespective of whatever type of aquaculture and that is that the households want to improve their livelihood.

The type of production i.e. technology of course will vary depending on which resources (natural and economical) are available to the household i.e. whether situated in coastal or inland communities, whether household or company. Whether the activity is sustainable or not is often related to maturity of development. i.e. whether the appropriate technologies have been developed and implemented.

The Historical Development Context

In freshwater aquaculture some 80% of the 380,000 tons fish production are made up by two fish species groups s.a. the Chinese and Indian carps, which were introduced as late as in the 1960's and 80's respectively. "Mossambicus" tilapia was also introduced in the 60's, but showed not to be an appropriate species, and the production fated out. More recent introduction of Nile tilapia shows better potential and the present 4% share of production volume is expected to increase rapidly in coming years as extension and fry availability are increased. The rest of the production is made up from native species.

Before the introduction of the foreign carps, and simultaneous the introduction of hatchery technology, the fish production in rural inland areas was made up from inland capture fisheries and to a lesser extent from farming of wild captured fry of many native species. The volume was low although the increased need for food generation together with these practices led to gross depletion of the inland fish resources as well as to diminished biodiversity and actually it was not sustainable.

The development of marine fish farming can be considered at the same stage as freshwater fish farming nearly half a century ago and maybe even more constrained due to lack of appropriate on growing techniques due to the larger challenges involved in farming the inshore areas. Marine-farmed fish production is low and accounts for around 5,000 tons and have not experienced any significant growth for several years.

The possibility to tap the potential of using marine fish farming as a means for livelihood improvement is seriously constrained mostly because there is a lack of appropriate technologies. The present fish farmers are trapped into using unsustainable practices. The use of wild fry (or lack of hatchery produced fry) put stress to the recruitment of fish for capture fisheries and even on biodiversity, and there can also be a lack of the most appropriate fry species. The present use of trash fish for feed leads to various constraints in production (see below) as well as a negative impact on the environment, and finally the available "traditional" cage technology forces the farms to cluster in very protected but vulnerable areas. This eventually leads to serious negative environmental impact and production limitations s.a. diseases or low growth performance due to high level of suspended material and limited oxygen content.

Of course the constraints in availability of fry and suitable areas using the present farming technology and practices also leaves the livelihood potential untapped or unavailable for newcomers irrespective of the huge and increasing need for developing alternative livelihoods in the coastal zone. It is especially a need for the land-less inshore fisher families, who by the number of many thousands a year, are forced away from fisheries due to depletion of inshore fish stocks. The development of offshore fisheries cannot absorb but a fraction of the inshore fishermen, and as

land-less people they have very few possibilities for diversification of their livelihood. Even a very large part of the soil in the coastal area is too infertile to sustain more families based on agri-productions and as such this does not provide a realistic alternative. Therefore aquaculture is one of the realistic options for livelihood diversification, which needs to be further addressed and developed.

As an example the 8 coastal communes of Ha Tinh province in northern Vietnam have a population of 53,000 of which about one third is engaged in fisheries and aquaculture. Although on a macro-level Ha Tinh province is not an important fishing province as it only contributes 1.4% to the total output from the fisheries sector in Vietnam (1997), the employment figures clearly show that the fisheries and aquaculture sector is very important contributors to the livelihood at the micro-level.

The volume of landings from capture fisheries has declined from 15,000 tons in 1995 to estimated 12,000 tons in 1998 due to decline in inshore fish resources. The government and regional authorities support or plan to support family groups to build vessels for offshore fishing. Presently about 10–20 boats have been build every year during the last years. This will create jobs for about 200 persons/year. But every year the fleet of small inshore boats is reduced 500 units by the fishermen themselves due to lack of profitability. Each unit has provided income to 4 persons i.e. 2,000 persons/year. This means that even in Ha Tinh, which is not an important fishing province, some 1,800 coastal fishermen are in need to find a new livelihood every year.

But no or limited development planning and strategies exists, which can assist families entering marine aquaculture in new areas or protect the production of the present farmers as well as protect the environment in present areas. Even if a much needed restrictive planning within the present vulnerable farming areas was made, it would be seriously threatened by the huge pressure/need for finding a new livelihood, and therefore the implementation would not be realistic, if no other farming alternatives (areas) could be given/suggested. This is why the term "entrapment" of the present fish farmers, job and land-less fisher families and Government is found descriptive within the present situation.

This is why there is such an immediate need for appropriate marine fish farming technologies to be able to improve farming practices and to expand into new less vulnerable areas in the marine/coastal region. But the institutes responsible for developing the appropriate technologies do not have this capacity at present, and this is why several components in the present project addresses some of the above needs for capacity building.

Contents of Project

The first overview is the logical analysis of the project:

DEVELOPMENT OBJECTIVE	Contribute to poverty alleviation through increased use of sustainable aquaculture in Vietnam.
IMMEDIATE OBJECTIVE	Improved capacity of research and education of RIA-1 towards development of sustainable aquaculture.
OUTPUTS	1. Genetic improvement of Nile tilapia strains implemented. 2. Strategies for health and hygiene management developed. 3. Coastal and marine aquaculture technologies introduced. 4. Existing educational programs strengthened and new programs implemented. 5. Effective project management and monitoring in place.

The main outputs are:

1. *Genetic improvement of Nile tilapia strains for tolerance of low temperature and salinity.*

By year 3 the following objective verifiable indicators (OVI) have been set: A national breeding program for at least 2 species started at RIA-1. 10 "poor" households located in each of 3 representative communes (delta, mountain and north-central Vietnam) adopt improved tilapia and attain average incomes showing a net benefit increase of 20% above baseline as compared to households without improved strains. The 3rd generation of improved tilapia shows 15% increases of growth rate in target environment of RIA1. On-farm trials with improved tilapia have been conducted at 45 sites involving 70% of women receiving benefits.

2. *Strategies for health and hygiene management developed. This component has 2 sub-components: Disease and Environment.*

The OVI for the disease component are: The fish disease unit can analyze disease situation and provide diagnostic services within bacteriology, virology and mycology. An overview of disease situation in aquaculture is produced for north Vietnam. Important factors associated with Red Spot Disease of cultured grass carp in North Vietnam have been identified and RIA1 staff has prepared a proposal for control strategy.

The OVI for the environment component are: All aquaculture activities in the Project fulfill best environmental practices as approved by Ministry of Fisheries, Vietnam. Guidelines for environmental impact assessment and water management practices documented.

3. *Coastal and marine aquaculture technologies introduced. This component has 2 sub-components: Coastal and Marine.*

The OVI for the coastal component are: Rotation cropping technology has been successfully established at the RIA1's brackish water pond facility at Cau Bung (Quynh Luu, Nghe An province) showing increase in net benefit and has been demonstrated to 20 sites.

The OVI for the marine component are: A draft manual on production of marine fish fingerlings has been produced. Broodstock of sea bass, red sea bream and snapper is established at RIA1's hatchery facility Cua Lo (at Vinh, Nghe An province) and at RIA1's sea cage facility at island of Hon Nieu off Cua Lo. Two batches of fingerlings as well as at least five tons of marketable fish have been produced.

4. *Existing educational programs strengthened and new programs implemented M.Sc.*

The OVI for the educational component are: 10 M.Sc. students graduate and an additional 10 students about to finish their studies. 2 Ph.D students are writing their thesis. From the total of 22 students at least 30% shall be female. 5-6 of the graduates will be engaged as RIA-1 staff at the completion of studies.

5. *Effective project management and monitoring in place (assistance to local project management.*

The OVI for the management component are: Reports, budgets and work plans are submitted on time. Documentation submitted is qualitatively satisfactory. 90% of all target projects are met on time and 90% of the annually budgeted and approved funds are spent in that year.

Only those components of relevance to the coastal and marine area will be further detailed.

The Coastal Aquaculture Component

In the coastal areas of the northern central and northern part of Vietnam coastal pond culture of shrimp started in the late 1980's starting from very extensive "keeping/ entrapment" ponds. But presently the farms can only produce one crop of shrimp a year due to too low temperatures during winter, and as such the farming activity is not serving according to the full potential for increasing the livelihood. Therefore it is tried to introduce an integrated or polyculture farming (or rotation cropping) approach using mud crab (*Scylla serrata*) and tilapia to increase to overall production and income generation from the ponds/enclosed water bodies. The procedures are outlined in table 1.

Table 1: Example of rotation cropping for Nghe An province

Activities in Rotation Cropping	Harvesting	Year Cycle											
		1	2	3	4	5	6	7	8	9	10	11	12
Prepare ponds													
Stocking with shrimp larvae													
Shrimp grow out	Harvest starts end July												
Stocking with tilapia fry													
Tilapia grow out	Harvest starts November												
Stocking with mud crab seed													
Crab grow out	Harvest starts Feb. next year												

There are several constraints posed upon rotation cropping. With the increasing use of rotation cropping in the target region, the availability of mud crab seed will get

increasingly scarce, because so far all the mud crab seed have to be collected from the wild.

Likewise no well-performing shrimp hatcheries exist in the target region, and the fry purchased from central region is often carrier of different diseases haunting most of the approximately 8-900 shrimp hatcheries in the south central, which are clustered in the bay areas without planning.

The tilapia fry is supplied from regional hatcheries and nurseries. They normally supply fry for freshwater culture, and therefore the performance of the tilapia is not optimal for the conditions in the rotation cropping. The strain available has low performance grown at low temperatures and in brackish water. This constraint is targeted in the genetic project component by introducing selection programs for increasing salinity and low temperature tolerance.

The Marine Fish Farming Component

The marine fish hatchery has just been completed and is based on the controlled intensive production principles, which makes it possible to use for a multi-species approach. Within the present project focus is given fry production of Asian sea bass, snappers and red sea bream. But the flexible live food production unit also includes copepod production, which makes it possible to target many other fish species.

The technological capacity achieved by RIA1 should make it possible to enter adaptive research to develop special designs suitable for dissemination.

With regards to broodstock keeping this poses obvious constraints to the different pilot marine fish hatchery activities in Vietnam. To eliminate this immediate constraint within the project period and to be able to concentrate on capacity building within the hatching technology a shortcut had to be made. Two very small-sized plastic-tube cages were imported to provide an immediate safe housing of the valuable broodstock in the harsh exposed conditions of the Cua Lo area.

Apart from the above mentioned cages a locally build wooden raft structure with a central platform with a hut and smaller surrounding cages have been installed for handling of stock during biological tests. The traditional rigid raft design has been given approved hydro-elastic capacity by the simple addition of car tyres as hinges between the cage compartments to make it sustain the more exposed conditions than normally used in Vietnam.

Low Cost Cages

It is fully appreciated that this cage technology is not appropriate for the future marine farming development in Vietnam even on a medium term. The above cages are suitable for research work at the institute, but the coast of central and northern-central Vietnam is very exposed and the target fisher society is very poor. The plastic-tube cage, even if produced in Vietnam, is too expensive and the present local rigid raft-cage technology can only be applied in very protected localities thus often causing adverse environmental impact on the restricted available area resources.

A draft design for a new promising cage structure has been made, which not only will be cheap, made from locally available material, and can withstand typhoons in the

very exposed localities, but also it takes into consideration the local infrastructure s.a. presently used fishing boats.

The new cage concept consists of small floats, rope and net. The mooring lines keeps the net volume distended rendering a heavy and expensive frame superfluous. This cage structure is also thought to be suited for being operated from the smaller circular woven bamboo dinghies found by the thousands along the coast. The unique issue in the draft concept is though that the special mooring design will make the net cage automatically submerge during strong winds/currents. This will prevent the strong deformation in net volume normally seen in traditional concepts, when exposed to storm and thus makes the concept promising for the typhoon belt of Vietnam. Still pilot tests will have to be performed during coming typhoon season as well as testing handling procedures to see whether they are suitable.

It is mandatory for the production efficiency and especially for the well being of the fish that larger volume units are used in future. Instead of having ten small cages it is better to have one larger. When entering more exposed areas this issue becomes more crucial because the fish needs to have the possibility to "escape" down in the net pen, when wave action becomes too severe.

Therefore very preliminary investment cost calculations have been made based on local market prices (not negotiated or volume purchases) of a 30m-circumference cage unit, which show costs less than USD 1,000 all included. When comparing the price of imported plastic cages with the new concept the investment cost in the new structure have been calculated to less than 3% of the cost of foreign cages and maybe 10% of the floating structure of present local cages with similar surface area.

Low Cost Feed

Presently trash fish are used as the only source of feed in marine fish farming in Vietnam. The use of trash fish poses several immediate constraints to the farming (it is appreciated that many more exist).

The supply and quality are often very fluctuating due to seasonality or due to weather conditions preventing the small boats and dinghies to go out fishing. To balance this there are only few "strategies" available to the farmers. Either to let the farmed fish starve, when feed is in low supply, or to invest in freezers, which can act as storage. Both of these solutions are not optimal, the first one for obvious reasons, secondly the use of freezers is also not suitable on a wider scale. Many of the fisher families (coming farmers) will not be able to invest in freezers, as well as they will not be able to pay (or have the continuous availability of) the power to operate the freezers.

An alternative or supplementary feed storage strategy, which will be looked into, is to produce an ensilage by adding acid to the trash fish. The ensilage can be produced, when trash fish is in plentiful supply and then be stored for longer periods. When to be used the ensilage is gelled adding a colloid from a local seaweed production to produce soft pellets as an "on-farm production". The use of the soft pellets would probably first be as a supplement, when fresh trash fish are not available but after an introduction period farmers probably will experience additional benefits from the use of soft pellets (for example diseases and parasites carried by the food fish will be eliminated).

The technology will not demand larger investments and will to the outside observer look very similar to the present traditional fish sauce production.

The project activity has a strong focus on development of a simple workable low-cost technology and should be seen as a first step in making the farming operation more feasible. It also includes better feeding strategies.

Other Project Components of Relevance for Increasing the Capacity within Coastal and Marine Farming

Already the relevance of the breeding programs for tilapia in the genetic component has been mentioned in the coastal rotation cropping paragraphs. Within the environment component are capacity to make environmental impact assessment is being build and a all aquaculture activities in the Project would have to fulfill best environmental practices. Within the disease component present focus is given building up capacity of the unit to be able to analyze disease situation and provide diagnostic services within bacteriology, virology and mycology. At this stage this is targeting the large freshwater fish production, but the capacity will be applicable to enter the marine area, too.

One of the main constraints against achieving development of sustainable aquaculture in Vietnam is the shortage of human resources at all levels working both in central research and development, in extension as well as in planning and controlling at provincial and ministry levels. The number of graduates or postgraduates in aquaculture working at provincial level is virtually zero. Also a most serious problem is seen is the enlarging gap between application and research. Thus, training qualified staff and researchers is particularly important to manage and guide aquaculture industry to sustainable development and this is why all the components are integrated into the curriculum of the education component, and the students will receive training at all facilities including the coastal and marine.

Conclusions

Most of the present marine fish farming is targeting the farming of high-value species s.a. groupers. This is an economical feasible production and within the present farming structure (technology) it could probably be questioned if many other alternative species exist unless focus also is given development of appropriate and more efficient technologies.

The focus on grouper is fully appreciated/understandable within the present context of inefficient or insufficient farming procedures including fry supply.

But it can be postulated that the present farming technology is keeping the farmers "entrapped" to farm a species, which apart from the immediate strength of a high-value also shows some weaknesses/threats for farming in a future wider marine fish farming development perspective due to its biological characteristics and the market segment possible to address:

- Grouper fry are taken from the wild and one of the more difficult species to mass produce in hatcheries (only few countries have a consistent hatchery production);

- Grouper species are typically solitary even sedentary species, which do not make full use of the production volume in cages, as the fish most likely will aggregate along the walls or floor of net.
- Groupers are marketed exclusively for the "live fish" market segment. The selling price though relatively high does not bring the "normal" price margin (or value added) to the farmer as the trading is easily controlled by middlemen and foreign traders as the handling/trading makes it necessary to control well boats and a very focused market the Hong Kong market (actually the main share of the profit margin is left for the foreign dealers). Thus from a development perspective this means that the main value added is actually directed abroad. Another issue within the grouper "live fish" segment is that the Hong Kong market being the target of the grouper productions of most of the countries in the region holds only a limited volume of about 7,000 tons. It is therefore predicted that the market shows a "normal" supply/demand collapse, when the large R&D effort put into grouper culture by a vast number of the countries in the region becomes fruitful and production increases. This would leave the Vietnamese marine fish farmers in a very vulnerable situation if they only have the present technology and farming management as a capacity base for their production.

It is therefore necessary for the present and coming fish farmers to be able to diversify/ escape from the "grouper entrapment" through adapting more adequate farming methods making it feasible to produce other fish species thus opening for a larger market both within the "live fish" segment but also for example within the fresh/chilled market segment. Though at present stage the latter segment could seem too inaccessible for the poor farmers, it obviously is possible within the freshwater fish species an even some companies/dealers in Vietnam have already developed a small outlet of air-flown fresh/chilled snappers for the large US snapper market.

From the above that many more marine fish farming technology and market issues remains to be developed or adapted to fit needs of the Vietnamese socio-economic, natural and regional conditions than those involved in the present capacity building project although this phase 1 is a step ahead. Likewise it should be emphasized that many issues relating to the other marine and brackish water productions within seaweed, molluscs and shrimps need to be attended.

Annex 7: Findings and Recommendations of Working Groups

Working Group on, Inland, Freshwater Aquaculture and Poverty Alleviation

Is freshwater aquaculture appropriate for poverty alleviation?
The working group considered that, with many examples throughout the country, small-scale, freshwater aquaculture was highly appropriate for poverty alleviation. The group, therefore did not spend time discussing this issue.

What is the current system for knowledge dissemination?
There was concern that there should be a clear policy for aquaculture extension for poverty alleviation. Although an appropriate system exists for coastal areas, this is not the case for inland provinces, where there is often no dedicated unit for aquaculture. At the provincial level the extension system is variable and often very limited.

Ideally, MOFI should create this structure. However, Decree no.13 specified that aquaculture extension is included in the remit of MARD and government policy on cutting man-power currently prevents the establishment of aquaculture extension units.

Even if such a system could be established there are human resource constraints. Because of the lack of career opportunity students are currently discouraged from following degree programmes in aquaculture.

How can knowledge dissemination be improved?
It would be good if members of social organisations could be trained in social (gender awareness, communication skills) and technical issues as grass-roots extension workers (via a "Training of Trainers"). However, it was stressed that the same information should be disseminated through many different channels/modes, including formal training use of mass-media distribution of leaflets and exchange visits. Training materials should be simple and visual.

How are poor people involved?
"End users" can influence the research underlying extension messages if the approach involves PRA type assessments of need at commune level. It may be possible to integrate such assessment with other programmes. Whilst responsibility for facilitating such assessments could lie with any organisation with relevant capacity and commitment it was felt that social organisations (VWU, FA, YU) were ideally suited to this role because of their grass-roots presence.

Where and what are the needs?
It was agreed that analysis of peoples needs and livelihood goals is crucial. It was recognised that while a broad front analysis was necessary there was general agreement that in Vietnam aquaculture was an appropriate entry point to livelihood improvement, because of low investment costs and quick returns.

It was agreed that such analysis should be oriented to helping farmers analyse reasons for poverty and finding possible solution. Those concerned should be skilled both in facilitation of this process and in the technical options. It was considered that the

social organisations and agricultural extension workers should work together as a team. Where no technical aquaculture specialists exist other extension workers could be trained.

It was agreed that capacity building in livelihoods approaches is required at all levels.

Policy and institutional arrangements
The development of the approach at the grass-roots level needs to be complemented by key policy change. At national government level MOFI needs to make a case for:

- Clarification in water-use policy,
- Establishment of micro-finance facilities and subsidies for aquaculture
- Policy change in relation to extension, specifically a clearly defined framework for the relationship between MOFI and MARD.

MOFI needs to demonstrate its own commitment to the SAPA programme by giving it prompt formal approval and submitting it to the government, committing financial resources and creating appropriate organisational structures to manage and implement the programme.

A steering committee should be formed that includes membership from other related ministries (MPI, MOSTE, MARD), and key donor agencies

Location for SAPA
The programme should be concentrated on the poorest communes where there is potential for aquatic resource development. It was recognised that priorities lie in the northern mountains central plateau and coastal provinces. Provinces in other regions may follow the same approach through access to alternative resources.

Developing recommendations for the SAPA framework
It was agreed that the programme is highly appropriate and that its objectives and main components were suitable. The next steps in development of SAPA should be:

- Collate the information from the scoping meeting and identify remaining information gaps. Some rich case-study evidence was presented on the impact of small-scale aquaculture on the rural poor. A fuller explanation of hard evidence from relevant programmes (especially with wider than single village context) should be assembled to properly illustrate the case for poverty alleviation.
- Develop an approach (involving the provinces, beginning with participatory assessments, the development of an extension process which might involve peoples organisations, other ministries)
- Identify capacity building needs to implement the approach
- Develop a programme document and raise awareness and promote in central government MPI and MARD, provincial Peoples' Committees, mass organisations VWU, FU, the banking sector VBP, VBA, etc

Further steps for development of SAPA should include:

- Select a number of pilot locations (based on poverty characteristics and aquatic resource potential) to test and refine the process based on the priorities of poor people
- Facilitate broader adoption of the approach through information and insights from the local level pilots

Working Group on Coastal and Marine Aquaculture and Livelihoods

Is coastal and marine aquaculture appropriate for poverty alleviation?
There was strong support from the group that coastal and marine aquaculture can be appropriate for improvement of livelihoods and poverty alleviation in coastal areas. However, there was less experience in alleviation of poverty alleviation through coastal aquaculture development.

Most experience relates to shrimp pond culture – including alternate/mixed farming systems, such as alternate cropping of shrimp with rice. The group considered that some extensive coastal pond systems based on capture of wild seed provided a low output compared and that, in the long term, such systems may not be sustainable. Farmers involved in extensive culture tended to be poor, at or below the poverty line.

The group discussions provided examples of other coastal farming systems. These included examples of seaweed farming, mud crab, fish (tilapia) pond culture, marine fish cage culture, lobster culture, mollusc farming, which involved poor people. It was noted that coastal aquaculture systems and species included a wide spectrum of species and farming systems from very low input systems (such as some mollusc farms) to high investment farms (such as intensive shrimp). There was a need to identify which species and farming systems are suitable for the different groups of people.

Unfortunately, there is limited experience and understanding of the impacts and appropriateness of the different systems and farming practices on poor people in Vietnam.

Constraints/problems in involving poor farming and fishing households
There are a number of constraints to be considered when considering aquaculture for alleviation of poverty among poor farming and fishing households.

- Low education levels among poor coastal residents
- Lack of experience with aquaculture. It was noted by the group that profitable coastal farming technologies, including crab, shrimp and marine fish farming, were rapidly taken up by coastal people.
- Land-water access/tenure, a major issue to address.
- Limited capital and access to credit.
- Alienation from decision making processes regarding aquaculture development and access to resources at commune, district and provincial level.
- Difficulties in accessing information, technical services and training, a constraint which is particularly acute among poorer groups in the community.
- Insufficient knowledge of low cost technologies and farming systems which are appropriate for

- Poor infrastructure for aquaculture development

The group considered that future development strategies under SAPA should give attention to addressing the following issues:

- The need for better planning at site/local areas and macro-level. In particular, greater emphasis was required on participatory planning involving poor people.
- The need for pro-poor focus in policy formulation involving aquaculture, at all levels of government.
- The lack of understanding of the social structures and therefore project impacts on the poor.
- The lack of adequate technical infrastructure and technical services.
- The importance of risk adverse strategies, i.e. interventions should contribute to reductions in risk to poor households, not increased risks.
- The importance of proper identification of targets within poverty focused aquaculture program, also based on an understanding of the livelihoods, needs and aspirations of these groups.
- The importance of better understanding the role of women in coastal/marine aquaculture.

Policy objectives for aquaculture development need to be clearer, particularly with reference to economic, social and environmental aspects. As an example, a social objective for aquaculture development might lead to a quite different approach that development driven purely by economic or export objectives.

The need for a strategic plan for using coastal or marine aquaculture as a tool in contributing to poverty alleviation was recognised. Capacity building as a key factor in addressing of above issues e.g. in participatory planning, targeting of women, policy development, should be given emphasis in such a strategy.

Experiences provided by provincial participants in Soc Trang and Hue
In Soc Trang, experience suggests that risks are greatest when poor farmers are involved in coastal shrimp culture, for various reasons:

- Poor farmers have limited funds – with limited funds, farmers are unable to select good quality seed, cannot construct good ponds, and least able to resist the shocks of crop losses.
- Poor farmers have a low knowledge base and understanding of risk.
- Poor farmers as a result tend to be most affected by shrimp disease.

In Hue, experiences in Tam Giang lagoon suggest that unplanned pen culture of shrimp has disadvantaged poorer fishing groups, although the overall benefit to the local commune where this has occurred appear to have been positive. In other areas of the lagoon, where a project has encouraged poor people to become involved in small-scale cage culture, benefits from aquaculture development have flowed to poor people.

The experiences indicate that pro-poor policies are required, and involvement of poor people during planning, is necessary if poor people are to benefit from aquaculture.

Key success factors?
There are several key factors to be considered when involving priority to the following:

- Involvement of poor people in planning for resource use in coastal areas.
- An approach based on understanding of the needs of poor people.
- Policy direction providing support to poor people's involvement in coastal aquaculture.
- Access to knowledge (supporting institutions, extension *etc*)
- Access to resources, including financial (credit), land and water.

How can knowledge dissemination be improved?
There is a national extension policy, but existing extension systems in coastal areas appear to be inadequate generally. Provincial level extension exists in coastal areas but need strengthening (extension covers fishing and aquaculture). Village and district levels have a limited extension network, and currently rely on alternative approaches.

There is differential access to extension, and the poor seem to be particularly disadvantaged. There is a need to develop more effective systems tailored to meet the needs of poor people, but the direction is not clear at the present time.

The group considered that government be encouraged to adopt a decree for fishery and aquaculture, to focus more resources into fishery and aquaculture extension. However, due to resource limitations, it may be difficult to expand extension services under current conditions. Thus, innovative approaches are probably required, such as:

- Strengthening extension through building on existing extension/community information dissemination systems.
- Promoting cooperation among various agencies.
- Farmer groups are important – training can then focus on key farmers who transfer technology to other farmers in the group.
- Collaboration between women's groups and extension centres should be encouraged to address women's issues in aquaculture
- Demonstrations often fail because they are not based on farmer needs/consultations, and probably should be receive less attention in current extension strategies.
- Use of better farmers as demonstrators among farmer groups.

The quality of extension is another issue which needs to be addressed, and the group was in broad agreement of the need to improve the quality of service provided. This situation could be improved through:

- More formal degree training in extension
- Better methodologies based on understanding of the needs of target groups.

How are the research, education and extension linked? How does learning and communication currently work?
The present linkages between the research, education and extension system appear to be very limited at the present time, and .the group considered that research and

educational institutions are still weak in supporting extension. Research and extension institutions generally target better off farmers, leaving poorer groups poorly serviced.

The group considered that poor people have limited influence on the research underlying extension messages.

Is there a mechanism for poor people to influence policy?
Several examples of locally effective mechanisms were discussed, but no input at higher levels of aquaculture policy development. The discussion suggested a need to provide for a clearer policy focus on poor people in aquaculture development

The group identified the need for mechanisms to ensure actively involve poor people in bottom up approaches to planning and implementation of aquaculture projects

It also noted that the knowledge requirements for fishermen would be different than farmers (*i.e.* the knowledge requirements of different target groups is different, and needs to be properly understood in any aquaculture development program).

What different media are used to access knowledge?
Extension material, booklets, radio and television were regarded as effective media tools for dissemination of messages to poor households, although poorer groups were less likely to have access to TV. The access of poor people to workshops and training courses was considered to be limited.

The group noted a need for appropriate extension messages tailored to needs of target audience and understanding of the farming system, and developed from a farmer perspective. Much existing extension messages in coastal aquaculture were technology driven, and less likely to service the requirements of poorer farmers.

Regarding the dissemination of knowledge, the group emphasized that any "transfer of technology" must be based on understanding of target group needs and opportunities.

Where and what are the needs?
The group considered that poor landless fishing households, of which there are several million, should be a primary target for SAPA. The government is direction in the development of policy to provide alternative livelihoods to this vulnerable group, and aquaculture seems to be one of the few viable alternatives.

The other poor target groups which should be considered include fishermen involved in illegal fishing; poor farm households near the coastal area, many of whom have very limited and poor agricultural land; households living within or around major lagoons; salt farmers, as the price of salt is low and there is a need to secure better livelihood; households in or near mangrove areas; and fishermen in areas of high marine biodiversity.

Women have a major role in coastal/marine aquaculture. Although they may not always be involved in production, they are a key person in the family. Women tend to be better than men at handling credit, and may be able to access credit through the

Women's Union. The group considered it necessary to establish a good policy to promote the beneficial role of women in coastal aquaculture.

The importance of development of aquaculture within the context of integrated coastal area management projects was identified, although experience in that particular subject in Vietnam appears to be limited.

Other issues arising during group discussion

- Many small fishermen are boat based and tend to move, creating special problems.
- Survey of small fishermen for credit – few want to receive the credit from the bank – as the capacity to return the loan from the bank is limited.
- Realistic level of financial and human resources is necessary if effective assistance is to be provided to coastal poor.

Development of SAPA

The group supported the objectives of SAPA which were relevant to the people living in the coastal areas. The next steps to development of SAPA should be:

- Collation of information from the scoping meeting and identification of remaining information gaps.
- Develop an approach (involving provinces beginning with participatory assessments, the development of an extension process, which might involve peoples organizations, and other ministries).
- Identification of capacity building needs to implement the approach
- Development of a policy document and strategy to raise awareness in central government, MPI and MARD, provincial peoples organisations, VWU, FU, Banking sector VBP, VBA etc.

As in the freshwater group, it was felt that there was a need for higher level policy to be informed by insights from the local level and by priorities of poor people through pilot projects.

It was also noted that policy for promoting aquaculture in mountain areas exists, and there is a need to establish similar policy for small coastal fishermen, including resettlement, where this is an issue.

The plenary discussions noted that most investment in coastal aquaculture was from the "private" sector (*i.e.* mostly non-government, at different levels of investment depending on the scale of operation). The subsequent discussions emphasised the importance of engaging all potential groups including the private sector, civil society, and government in SAPA.

The list on the following pages is also available at the vietnamese Ministry of Fisheries' homepage at:

http://www.fistenet.gov.vn/tienganh/Framesta.htm

Donor	Project Title	Project date	Commitment (US$'000)	Grant/ Loan	Executing Agency (EA)	Implementing Agency (IA)	Co-implementing	Project Objectives	Geographic Coverage
ACIAR	Mixed Shrimp Farming-Mangrove Forestry Models in the Mekong Delta (FIS/1994/012)	1995-01	599	Grant	MFIS	RIA-2	Australian Institute of Marine Science and NACA	This project will investigate the reasons for the decline in shrimp and wood and evaluate alternative management practices with the aim of providing a scientific basis for maximizing sustainable yields.	Ca Mau (Ngoc Hien District)
ACIAR	Reservoir Fishery Development & Management in the Northern Mid-Highland Region (FIS/1997/068:)	1999-00	94	Grant	MFIS	RIA-1	Deakin Uni.	The aim of this project is firstly, to determine the most suitable nursing method of fry to fingerling rearing of two species of carp, secondly, to evaluate the suitability of the two largest reservoirs in the region and thirdly, to develop suitable stocking and husbandry strategies to optimise fish yields.	Vinh Phuc
ACIAR	Development of Leading Centres for mud crab culture in Indonesia & Vietnam	2000-02	66	Grant	MFIS	RIA-3	QDPI	To develop "Lead Centres for Crab Aquaculture" at institutions undertaking nationally funded mud crab research programs in Vietnam & Indonesia to facilitate the broader transfer of research benefits from previous ACIAR funded project FIS/1992/017.	Nha Trang

Donor	Project Title	Project date	Commitment (US$'000)	Grant/ Loan	Executing Agency (EA)	Implementing Agency (IA)	Co-implementing	Project Objectives	Geographic Coverage
ADB	Fisheries Infrastructure Improvement Project (1404-VIE (SF))	1996-2002	53,616	Loan	MARD	MFIS, VBARD		1. To increase in a sustainable manner domestic and export earnings from marine fisheries. 2. To expand the catch within the limits of maximum sustainable yields estimates, increase the supply of better quality fish landed by reducing post-harvest losses through fishing ports improvement. 3 To promote improved marine resources and environmental management by increasing the availability of fisheries information and strengthening institutional capacity by training personnel at national and provincial levels.	Hai Phong (Cat Ba Island); Nghe An (Cua Hoi District); Ha Tinh (Xuan Pho District); Quang Binh (Cua Gianh District); Quang Nam (Thuan Phuoc-Song Han District); Binh Thuan (Phau Thiet District, Phu Quy Island); Ba Ria (Con Dao Island); Ca Mau (Ca Mau District); Kien Gian (Tac Cau District)
ADB (RETA 5552)	Coastal and marine environmental management					MOSTE		Regional technical assistance involving Cambodia, Viet Nam and China. In Viet Nam the RETA is preparing investment projects . The Minh Hai component involves the preparation of an integrated environmental management plan, including mangrove reforestation and aquaculture.	Ha Long Bay, Minh Hai, Ho Chi Minh city
ADB (TA-2382-VIE)	Coastal aquaculture study	1996	-	grant		MOFI		Completed. Prepared draft investment for possible ADB loan financing.	
Donor	Project Title	Project	Commitment	Grant/	Executing	Implementing	Co-	Project Objectives	Geographic

		date	(US$'000)	Loan	Agency (EA)	Agency (IA)	implementing		Coverage
AusAID	Capacity building for young researchers	2000-2001	176	grant	Deakin university	Ria No.1	-	To lift the aquaculture industry performance by improving scientific research and training.	-
Belgium	Marine Aquaculture in the Mekong Delta and Upgrading Research and Educational Capacity (BADC/ UNIV/14)	1997-2000	434	Grant	Can Tho Uni.	ASRDC	State Uni. of Gent	To upgrade the educational capacity of the Can Tho University in the field of marine aquaculture, setting up a centre where Vietnamese staff, extension workers, teachers and aquaculturists can be trained.	Can Tho
CIDA	Training in Fisheries Business Management	1998-2002	300	grant	CIDA	MOFI	-	Strenghtened capacity of three fisheries colleges and improvement of training facilities	..
CIDA	Vietnam Canada Ocean and Coastal Cooperation Project, Fisheries Component	.	260	grant	CIDA	MOFI	-	.	.
CIDA	Fisheries human resources and technological development	.	350	grant	.	Fisheries college No.1	-	.	.
CIDA	Development of Human resources in Aquaculture	.	400	grant	-	Fisheries College No.4	-	.	.
CIDA	Feasibility study on rehabilitation and upgrading of fisheries infrastructure	1993-1994	350	Grant	CIDA	MOFI	-	Survey on demand and potentials, planning for development of fisheries infrastructure	-
Donor	**Project Title**	**Project date**	**Commitment (US$'000)**	**Grant/ Loan**	**Executing Agency (EA)**	**Implementing Agency (IA)**	**Co-implementing**	**Project Objectives**	**Geographic Coverage**

DANIDA	Assessment of the Living Marine Resources in Vietnam: Phase 2 (104.Vie.29)	1999-03	5,261	Grant	MOFI	RIMP, MOFI		To increase the contribution from fisheries to the national economy and social development on a sustainable basis	National Level
DANIDA	Fisheries Sector Programme Support (Fisheries SPS) (104.Vie.41)	TBA	41	Grant	MOFI	Provincial Fisheries Dept.		Environmentally and socially sustainable growth in the fisheries sector in line with the international standards	Nghe An; Ha Tinh; Bac Kan; Khanh Hoa; Quang Ninh; Other provinces to identified during implementation
DANIDA	Coastal Aquaculture	TBA	1,000	Grant				Environmentally sustainable coastal aquaculture development in the North-Central Coastal region of Vietnam	Thanh Hoa; Nghe An; Thua Thien-Hue
DANIDA/WB	Viet Nam coastal wetlands protection and management development.	2000-ongoing	65,600	31,100 loan and 11,300 grant	DANIDA	MOSTE		Restore mangrove forests along the 470 km Mekong coast, giving a boost to aquaculture and improve the quality of live.	Tra Vinh, Soc Trang, Bac Lieu, Ca Mau
DANIDA	Fisheries masterplan project	1995-1998		grant	DANIDA	MOFI		Preparation of a fisheries masterplan for the Ministry of Fisheries.	
Donor	**Project Title**	**Project date**	**Commitment (US$'000)**	**Grant/ Loan**	**Executing Agency (EA)**	**Implementing Agency (IA)**	**Co-implementing**	**Project Objectives**	**Geographic Coverage**

DANIDA	SEAQIP, Seafood Export and Quality Improvement Project (104.VN.31)	1996-1999	3,300	Grant	DANIDA/ MOFI	MOFI	Prov. Dept. of Fisheries and processing	1. To improve the utilization of the living resources in Vietnamese waters. 2. To improve the export earnings of the Vietnamese fisheries sector and increase the income potential of small-scale fishermen.	National Level
DANIDA	Upgrading Vietnamese Seafood standards and marketing abilities (US.VIE 93/058)	1994-1995	.	grant	UNIDO	MOFI	MOFI	.	.
DANIDA	SEAQIP II, Seafood export and quality improvement programme (104.Vietnam.31) Component under SPS	2000-2005	6,500	grant	DANIDA/ MOFI	MOFI	Provincial departments of Fisheries and processing industries	.	.
DANIDA	Assessment of Living Marine Resources of Vietnam (phase 1)	1997-1999	2,342	grant	.	RIMP	.	.	.
DANIDA	Support to Fresh water Aquaculture (SUFA) (a component of the Fisheries SPS)	2000-2005	6,350	grant	DANIDA	MOFI	.	Increased consumption and income from sustainable freshwater aquaculture by rural communities.	3 National Broodstock centres; national level: Training of hatchery staff: nationwide; extension service: Bac Can, Nghe An, Ha Tinh provinces.
Donor	**Project Title**	**Project date**	**Commitment (US$'000)**	**Grant/ Loan**	**Executing Agency (EA)**	**Implementing Agency (IA)**	**Co-implementing**	**Project Objectives**	**Geographic Coverage**

DANIDA	Support for brackish water and Marine Aquaculture (SUMA) (a component of the Fisheries SPS)	2000-2005	6,460	grant	DANIDA	MOFI		To strengthen the administration and management practices as required to supply marine aquactic products through environmentally and socially sustainable aquaculture development.Topics: Legislation, Aquaculture planning, Technology development, pilotcommunity projects, Credit, HRD capacity building, Information collection and dissemination	On national level and 5 provinces, Quang Ninh, Ha Tinh, Nghe An, Khan Hoa and Ca Mau
DANIDA	Establishment of the monitoring programme in the bi-valve mollusc harvest area exported into Europe	1997-1999	256	grant	DANIDA	MOFI		Establishment of programme monitoring the bi-valve mollusc harvest exported to the EU.	
DANIDA	Support to industry restructuring and enterprise development (SIRED)	2000-2004	3,800	grant	DANIDA	MOFI		Establish capacity of the MOFI to advise and assist fisheries related enterprises to become autonomous and market oriented	
DANIDA	Strengthening of the fisheries administration (STOFA)	2000-2005	12	grant	DANIDA	MOFI		Strengthened capacity of the fisheries administration to formulate and implement policies related to the fisheries	
Donor	**Project Title**	**Project date**	**Commitment (US$'000)**	**Grant/ Loan**	**Executing Agency (EA)**	**Implementing Agency (IA)**	**Co-implementing**	**Project Objectives**	**Geographic Coverage**

DANIDA	Danida project of support to the AIT aqua outeach program (Vietnam Component) phase 1	1995-1999	400	Grant		RIA1, Uni of fisheries Nha trang, Univ. of Agr. And For. HCM city, Fisheries vocational college No.4	AIT		
DANIDA	Danida project of support to the AIT aqua outeach program (Vietnam Component) phase 2	1999-2002	400	grant		Ria No.1, University of fisheries Nha trang, Univ. of Agr. And For. HCM city, Fisheries vocational college No.4	AIT		
EU	Environmental assessment of mangrove reforestation as a means of improving coastal protection, stability and fisheries production.	1994-1997		grant	MRC	MRC		Regional project with mangrove replanting site in Can Gio district, Ho Chi Minh city. Includes introduction of aquaculture into mangrove areas.	Ho Chi Minh city
FAO/UNDP (VIE/83/002)	Prawn seed/brackishwater aquaculture	1983-1985	902	grant	FAO			Prawn seed/brackishwater aquaculture	
Donor	**Project Title**	**Project date**	**Commitment (US$'000)**	**Grant/ Loan**	**Executing Agency (EA)**	**Implementing Agency (IA)**	**Co-implementing**	**Project Objectives**	**Geographic Coverage**

FAO/UNDP (VIE/86/010)	Seaweed/agar-agar production and processing development	1987-1990	960	grant	FAO			Seaweed culture development project in Hue? (some of the seaweed culture areas supported by the project have since been converted to shrimp ponds).	Thua Thien Hue
FAO/UNDP (VIE/86/011)	Freshwater fish culture research and extension	1987-1990	1,140	grant	FAO	Ria No.1		Freshwater extension and strengthening of capacity at Aquaculture Institute No 1. The second phase of the project (from 1990-1996 involves some limited strengthening of extension capacity for brackishwater aquaculture in the northern provinces).	Northern Mountains
FAO (TCP/VIE/6856)	Artemia culture for aquaculture use	1986-88	80	grant	FAO	Can Tho University		Preparatory work to assist in establishing the Artemia research center of Can Tho University. Subsequently supported by the EC.	Vinh Chau, Minh Hai
FAO (TCP/VIE/6659)	Quality control for fishery	1986-88	250	grant	FAO	MOFI		Quality control improvement at the Quality Control Center of the Central Fisheries Products Cooperation.	
FAO	Study on aquaculture in Mangrove areas for Forest Inventory and Planning Institute	1989	30	grant	FAO	FIPI		To asess the aquaculture potential of the Dat Mui Forest Enterprise Area and especially the possibilities for aquaculture in the mangrove areas.	Ca Mau
Donor	**Project Title**	**Project date**	**Commitment (US$'000)**	**Grant/ Loan**	**Executing Agency (EA)**	**Implementing Agency (IA)**	**Co-implementing**	**Project Objectives**	**Geographic Coverage**

FAO (97/VIE/006) Telefood	Promote aquaculture with a view to improve women living conditions and income generation	1999	10	grant	Womens Union Nghe An	Womens Union Nghe An		To assist the women of Kim Lien commune, Nghe An province to improve their living conditions through aquaculture development.	Nghe An
FAO (98/VIE/007) Telefood	Establishing ice-supplying system for the poor fisherfolk in Thach Kim Commune	1999	10	grant	CPC of Thach Kim	CPC of Thach Kim		Facilitate the production of ice to meet the existing demand of the artesanal fishermen and support the preservation and quality of the fishery products	Ha Tinh
FAO (99/VIE/003) Telefood	Establishment of a small scale shrimp hatchery in Thuan An Commune.	2000	10	grant	DOFI	DOFI		To assist the shrimp farmers to restart their activities after the floodings from last November and generate income to improve their livelihoods. The project will provide 5 to 7 million shrimp (P.monodon) nauphi per year to the shrimp farmers of the Thua Thien Hue province.	Thua Thien Hue
FAO (00/VIE/001-004) Telefood	Fish pond and hachery construction to support the food security of Leprosy Affected Persons (PAL) in Van Mon Leprosy Treatment Centre, Thai Binh Province	2001	34	grant	FAO	Van Mon Leprosy treatment Centre	FAO, Ria No.1	To improve the living conditions, food security and income of those living in the Van Mon Leprosy Treatment Centre.	Thai Binh
Donor	**Project Title**	**Project date**	**Commitment (US$'000)**	**Grant/ Loan**	**Executing Agency (EA)**	**Implementing Agency (IA)**	**Co-implementing**	**Project Objectives**	**Geographic Coverage**

FAO/ Norway	Emergency assistance to poor and vulnerable fish farmers in the flood affected province of Dong Thap	2001	123	grant	FAO	Univeristy of Can Tho	Aquatic resources protection department of Dong Thap province	Provide the poorest and most vulnerable 860 fish farming households equally divided over 4 districts (Tan Hong, Hong Ngu, Tam Nong, Thanh Hung) with sufficient good quality fingerlings and nets to enable them to resume aquaculture activities; Monitoring the fish disease situation after the floods and provision of support to disease affected fish farmers in order to avoid further damage to the aquaculture sector in the province; Provide training on fish feed and fish health management to selected farmers to decrease the risks involved in fish production in relation to the yearly floodings.	Dong Thap
FAO	Fisheries Overview (VIE/92/003)	1993-1994	150	Grant	FAO	MOFI	.	Overview and orientations for aquaculture development	.
FAO	Fish farming in Bac Thai (TCP/VIE/6672)	1993	150	grant	FAO	DOFI	.	Technical assistance to pond aquaculture in Bac Thai	Bac Thai
France - CIRAD	Cat Fish Reproduction in Cages	1994-00	330	Grant	Province Agifish	CIRAD, Can Tho Uni.	.	Development of methods for cage reproduction of cat fish in the Mekong Delta	Mekong Delta
ICLARM	Farming systems research	.	.	grant	.	Can Tho University	.	.	.
ICLARM	Community based fisheries management and co-management	1998-2001	58	grant	.	MOFI	.	Improved management methodologies and sustainable use of coastal resources and relating eco-systems	.
Donor	**Project Title**	**Project date**	**Commitment (US$'000)**	**Grant/ Loan**	**Executing Agency (EA)**	**Implementing Agency (IA)**	**Co-implementing**	**Project Objectives**	**Geographic Coverage**

IDRC	Management of biological resources in Tam Giang Cau Hai lagoon system, Thua-Thien Hue province.	1995-2001	.	grant	IDRC	Univ. of Hue. (forestry and agriculture and science)	.	Research on the management of Tam Gian Cau hai lagoon system, including aquaculture management	Thua Thien Hue
IDRC/CIDA	Participatory assessment of integrated resource management at Ganh Rai Bay	2000-2001	.	Grant	IDRC	Institute of Trpical Biology, HCM city	.	.	.
IDRC/CIDA	Environmental management of coastal aquaculture in Xuan Dai Bay and Dong Bo Field	2000-2001	.	Grant	IDRC	Ria No3.	.	.	.
IDRC/CIDA	Assessment of environmental changes & related activities on Xuan Thuy Ramsar	2000-2001	.	Grant	IDRC	Centre for natural research and environment (CRES), Hanoi	.	.	.
IDRC/CIDA	Study on community based aquaculture mangrove integrated farming for sust use and management of coastal environment resources in Ca Mau province	2000-2001	.	Grant	IDRC	Institute of marine aquaculture, Can Tho University	.	.	Ca Mau
Donor	Project Title	Project date	Commitment (US$'000)	Grant/ Loan	Executing Agency (EA)	Implementing Agency (IA)	Co-implementing	Project Objectives	Geographic Coverage

IDRC/CIDA	Preliminary assessment of public participation in mangrove forest management through land allocation and forest care policy in Can Gio	2000-2001	.	Grant	IDRC	University of Agriculture and Forestry, HCM city	.	.	Can Tho
IDRC/CIDA	Solutions to problem retrogression of environmental and hydrobiological resources at Nai Swamp in Ninh Thuan province	2000-2001	.	Grant	IDRC	Nha Trang University of Fisheries	.	.	Ninh Thuan
IDRC/CIDA	Protection of Aquatic resources at Hoang Mai river estuary through participatory management	2000-2001	.	Grant	IDRC	Ria No1.	.	.	.
Donor	**Project Title**	**Project date**	**Commitment (US$'000)**	**Grant/ Loan**	**Executing Agency (EA)**	**Implementing Agency (IA)**	**Co-implementing**	**Project Objectives**	**Geographic Coverage**

IDRC/CIDA	Man-made threats to biodiversity of tidal wetlands in Tien Lang coastal area, Hai Phong city	2000-2001		Grant	IDRC	Hai Phong Institute of Oceanology (HIO)			Hai Phong
IFAD	Agricultural Resources Conservation and Development Project in Quang Binh (VIE/96/007)	1997-02	14,441	Loan	PPC Quang Binh	PPC Quang Binh	VBARD	To increase the incomes of about 60.000 direct beneficiary households through project activities in 7 areas: irrigation rehabilitation; agricultural development; aquaculture development; sand dune fixation; rural road rehabilitation; institutional support; credit and saving services.	Quang Binh (Minh Hoa, Tuyen Hoa, Quang Trach, Bo Trach, Quang Ninh, Le Thuy Districts)
Italy	Support to the fisheries and aquaculture development in north of Vietnam	1992-1994	6.800	loan	MOFI	NASCO, Ha Long - FISHCOM		Development of aquaculture in Hoa Binh, Nghe An, Hai Phong, Quang Ninh and Ha Tinh through NASCO, to build IQF facility and to buy equipment for agar production	Hoa Binh, Nghe An, Hai Phong, Quang Ninh and Ha Tinh
Donor	**Project Title**	**Project date**	**Commitment (US$'000)**	**Grant/ Loan**	**Executing Agency (EA)**	**Implementing Agency (IA)**	**Co-implementing**	**Project Objectives**	**Geographic Coverage**
Italy (NGO)	Developmetn of Fish-Breeding and Aquaculture Programme	1993-1996	1,098	grant	Africa 70	SEAPRODEX		Project for the development of fish-breeding along the coast of small fishing centres to help the resettlement of refugees in Quang	Quang Ninh

								Ninh province	
IUCN/SIDA	Support to wedlands conservation programme in Vietnam	1992-ongoing		Grant	MOSTE	MOSTE		Support to develop the capacity to manage Viet Nam's wetlands. The pilot projects being developed in selected coastal provinces include a component on income generation through aquaculture.	Nghe An; Than Hoa. Other provinces to identified during implementation
IUCN/GEF/ DANIDA	Hon Mun Marine Protected area Pilot Project	2001-2005	2.123	Grant	IUCN	MOFI		To conserve a representative example of int. significant and threatened marine biodiversity. To enable local island comm to improve their livelihoods and effecitvely protect the marine biodiversity at Hon Mun as a model for col-laborative MPA management in Vietnam.	Khanh Hoa
JICA	Assessment of pelagic fish resources	1993		grant	JICA	MOFI		Fishery sector survey	
JICA	Construction of Cat Lo and Vung Tau Fishing Port	1995-1999	23,000	grant		PPC Vung Tau		Improve the handling and quality of the fishery products	Vung Tau and Cat Lo
JICA	Study on Integrated fisheries in the Indo Chines Region	1998		grant	JICA	MOFI			
Donor	**Project Title**	**Project date**	**Commitment (US$'000)**	**Grant/ Loan**	**Executing Agency (EA)**	**Implementing Agency (IA)**	**Co-implementing**	**Project Objectives**	**Geographic Coverage**
JICA	Study on the implementation of marine aquaculture in Vietnam	2000		grant	JICA	University of Nha Trang	Ria No.3	Identificate the possibilities for marine aquaculture in Vietnam, with respect to species and market opportunities	Nha Trang

JICA/FAO	Training on fish diseases in three areas (GCP/INT/526/JPN	1991-1993	100	grant	JICA	FAO	Ria's	Staff training and upgrading equipments for fish disease checking	Nationwide
JICA	Marine Fisheries Resources Study	1995-1997	3,650	grant	.	RIMP	.	Assessment of pelagic resources within the economic zone of Vietnam	.
JIVC	Preservation of Mangrove Forestry	1992	77	.	DPP	.	.	In order to prevent cutting down of mangrove tress, the project aims to increase livelihood of people living in mangrove areas through introducing alternative livelihood opportunities (includes aquaculture?).	Ho Chi Minh city
JIMSTF	Development of sea weed forests along the coast of Vietnam using artificial blocks to improve marine environment of the country	1998-2000	.	grant	Japan Int. Marine Science and Technology Federation	Oceanographic Institute in Nha Trang	.	.	.
MRC	Rural Extension for Aquaculture Development (READ)	1998-2001	1,947	Grant	MRC	MOFI (RIA2)	VBARD	Increase income for small scale farmers through aquaculture through development and operation of an efficient aquaculture extension network	Tien Giang in Viet Nam and Takeo, Preyveng, and Kandal in Cambodia
Donor	**Project Title**	**Project date**	**Commitment (US$'000)**	**Grant/ Loan**	**Executing Agency (EA)**	**Implementing Agency (IA)**	**Co-implementing**	**Project Objectives**	**Geographic Coverage**
MRC	Freshwater prawn hatchery	1987-1990	954	grant	MRC	Ria No.2	.	Development of a freshwater prawn hatchery at Vung Tau. The center has been subsequently used to produce shrimp post-larvae.	Vung Tau

MRC	Assessment Mekong Fisheries: Migration and Spawning and impact of Water Management	1997-2003	5,213	grant	MRC	MOFI, (RIA2)	-	covers 4 countries	Mekong Delta in Viet Nam
MRC	Management of the Reservoir Fisheries in the Mekong Basin, Phase I	1995-2000	3,491	grant	MRC	MOFI(RIA3)	-	To increase the production from reservoir fisheries, through enhanced capacity of government fisheries agencies to plan and manage reservoir fisheries on a sustainable basis; and to develop community based fisheries management institutions in the Lower Mekong Basin	Central hihgland of Viet Nam (Daklak)
MRC	Management of the Reservoir Fisheries in the Mekong Basin, Phase II	2000 - 2004	4,455	grant	MRC	MOFI (RIA3)	-	Sustaninable co-management models for optimal fish production in reservoirs develop, implemented and disseminated in the Lower Mekong Basin (4 countries)	Central hihgland of Viet Nam (Daklak)
MRC	Aquaculture of Indigenous Mekong Fish Species	2000-2005	2,630	grant	MRC	MOFI, (RIA2)	-	Economically feasible aquaculture systems developed using indigenous Mekong fish species, which may complement or rplace the use of exotic species for culture purposes in the Mekong basin, covers 4 countries	Mekong Delta in Viet Nam
Donor	**Project Title**	**Project date**	**Commitment (US$'000)**	**Grant/ Loan**	**Executing Agency (EA)**	**Implementing Agency (IA)**	**Co-implementing**	**Project Objectives**	**Geographic Coverage**
Netherlands	Rehabilitation of Mekong delta mangrove forests	1996-1998	3,600	grant	-	-	-	Rehabilitation of mangove forests	Soc Trang, Minh Hai

Donor	Project Title	Project date	Commitment (US$'000)	Grant/ Loan	Executing Agency (EA)	Implementing Agency (IA)	Co-implementing	Project Objectives	Geographic Coverage
Netherlands	Vulnerability Assessment Project	1994-1996	-	grant	MARD	-	Dept. of drainage and irr.	Study of the effect of sealevel rise on the Vietnamese cost Includes a mapping/GIS exercise covering all coastal land +6m above MSL.	
Netherlands	Vietnam-Netherlands Integrated Coastal Zone Management Project	2000-2003	2.000	grant	SNV	MOSTE	Doste	Assist in the establishment of the required institutional structures at national and provincial level for ICZM, expand institutional and professional capacity to apply ICZM, develop long term strategy and action plans; and initiate short term application of ICZM in three provinces through practical problem solving approaches.	Thua Thien Hue, Nam Dinh, Baria-Vung Tau
NACA/ Worldbank	Case studies on best management practice in coastal shrimp culture	1999-2000	25	grant	NACA	Ria No1.	-	Case studies on development of best management practices and implementation of the Code of Conduct for Responsible Fisheries in the shrimp aquaculture sub-sector	
NACA	Impacts and management of aquatic animal diseases in small scale aquaculture in Tam Giang lagoon	2000	10	grant	NACA/ IDRC	Hue University	-	Study on impacts of disease on small scale fish and shrimp producers and development of appropriate management strategies	Thua Thien Hue

NACA/ FAO	Development of a national strategy for responsible movement of live aquatic animals	1998-2000	.	Grant	FAO/ NACA	Ria No1.	.	Vietnam national component as part of regional FAO TCP project TCP/RAS/6714 (A)	
NACA/ ADB	Aquaculture sustainability and environment	1994-1998	.	grant	NACA/ ADB	RIMP	.	Study of carp and shrimp aquaculture sustainability as part of the regional ADB technical assistance Aquaculture sustainability and environment	.
NORAD	Building advanced research and education capacity at RIA-1	1999-2002	1,500	grant	.	Ria No1.	.	Support to RIA-1 in Ha Bac	.
NORAD	Fisheries Legislation	1999-2002	1,316	grant	NORAD	MOFI	.	Support to MOFI in development of fisheries legislation	.
NORAD	Fisheries sector report (focussed on possible areas for cooperation with Norway)	1995-1996	.	grant	.	MOFI	.	Review of the fishery sector, including identification of areas for future cooperation. Areas of possible cooperation include the development of mariculture and assistance with the development of fisheries legislation.	.
NORAD	SAPA scoping meeting	2000	.	grant	MOFI	MOFI	.	Scooping meeting on Sustainable Aquaculture for Poverty Alleviation (SAPA) in Vietnam to stress the important role of aquaculture in development	Hanoi
Donor	Project Title	Project date	Commitment (US$'000)	Grant/ Loan	Executing Agency (EA)	Implementing Agency (IA)	Co-implementing	Project Objectives	Geographic Coverage

Nord Pas de Calais	Program for knowledge and valorization of the lagoons of Thua Thien Hue	1997-2001	-	grant	Laprocof	University of Science - Hue	-	Study and preserve the environment associating the population in the management and preservation of the site by rising awareness and guaranteeing higher revenues for the population	Thua Thien Hue
OXFAM-UK	Mangrove afforestation	1993	30	grant	PPC Ha Tinh	PPC Ha Tinh	PC Ky Anh	To reinforce seadykes, improve poor people's access to land, build up awareness and improve aquaculture activities	Ha Tinh
PEMSEA	National Demonstration Site for Integrated Coastal Management at Danang	2000-2004	-	grant	PEMSEA	DOSTE, Danang	PPC Danang	Workshop on Integrated Coastal Management. PEMSEA's project design is based on two management frameworks, namely:integrated coastal management and risk assessment/risk management. Demonstration sites will be set up throughout the region to implement these two mechanisms	coastal lands and waters of Danang Municipality including Son Tra Peninsula, Danang Bay, Son Tra coastal waters and their adjacent lands
PROFOUND	Women's small-scale aquaculture extension	1995-?	-	grant	Womens Union	Womens Union	-	Northern Mountains	-
Save the Children fund -UK	Mangrove Planting	1989	18	grant	-	-	-	Mangrove replanting	-
SARDI	Small-scale aquaculture for alleviation of poverty	-	-	-	-	Ria No1.	-	-	-
Donor	**Project Title**	**Project date**	**Commitment (US$'000)**	**Grant/ Loan**	**Executing Agency (EA)**	**Implementing Agency (IA)**	**Co-implementing**	**Project Objectives**	**Geographic Coverage**

SEAFDEC	Sustainable Development of Coastal Fisheries in Cat Ba	2000	-	-	Seafdec	RIMP	-	-	Cat Ba
SEAFDEC	Fisheries resource Survey in the waters of Vietnam and the Philipines (SD98-RS01)	1998-2000	-	-	Seafdec	BFAR, Philippines	-	Resource survey focussed on the resources of Tuna, oceanic squid and other highly migratory species and their ecological aspects	Off-shore
SEAFDEC	Utilization of by-catch for comminuted products in hai Phong, Vietnam (SD?RD99-CM01)	1999-2000	-	-	Seafdec	RIMP	-	Training of RIMP staff in By-catch utilization and post harvest technology	Hai Phong
SEAFDEC	Pilot project for semi-intensive culture of shrimp (to include conservation of mangrove friendly aquaculture) (SD/AQ99-CM03)	1999-2002	-	-	Seafdec	RIMP	MOFI	Project operated by RIMP staff to make a model for semi-intensive culture of shrimp to increase production and thus profitability, and at the sam time teach the fishfarmers how to conserve the resources, e.g mangroves	
SEAFDEC	On-site training program in vietnam (with emphasis on mangrove friendly aquaculture) (SD/AQ99-CM01)	1999-?	-	-	Seafdec	RIMP	-	Impart and exchange information on aquaculture technology, emphasising on mangrove friendly aquaculture.	Hai Phong
SEAFDEC	Monograph of Fishing Gear and Methods in Vietnam	1999-2000	-	-	Seafdec		-	This project will produce a document with all gears and fishing methods used in Vietnam.	
Donor	Project Title	Project date	Commitment (US$'000)	Grant/ Loan	Executing Agency (EA)	Implementing Agency (IA)	Co-implementing	Project Objectives	Geographic Coverage

SIDA/DANIDA	Rural aquaculture and curriculum development.	1998-?	.	grant	.	RIA-1	.	Support to rural aquaculture development and curriculum development for Bsc and Msc degrees at RIA-1.	.
SIDA	Inventory and Management of the wetlands in the lower Mekong Basin	1990-?	.	grant	MRC	.	.	Management of Mekong wetlands. Immediate objective is to establish a database.	Mekong Delta
SIDA	Rural development through Aquatic Resources management in Indochina phase 1	1994-1996	375	grant	.	RIA No.1, Univ. of Agr. And For. HCM city,	AIT	.	.
SIDA	Rural development through Aquatic Resources management in Indochina phase 2	1996-2000	500	grant	.	RIA No.1, Univ. of Agr. And For. HCM city,	AIT	.	.
Thailand	Support to development of a shrimp hatchery in Thanh Hoa province	1993-1994	400	grant	.	PPC Thanh Hoa	.	Thai govt support for the building of a shrimp hatchery in Tha Hoa coastal province.	Thanh Hoa;
University of Gent	Artemia and prawn culture techniques	1982-ongoing	.	grant	Can Tho Uni.	Can Tho University	.	The Artemia center has received support from the EC and NGO sources for the development of Artemia culture and shrimp hatcheries in Vinh Chau district of Minh Hai province	Vinh Chau, Minh Hai
Donor	**Project Title**	**Project date**	**Commitment (US$'000)**	**Grant/ Loan**	**Executing Agency (EA)**	**Implementing Agency (IA)**	**Co-implementing**	**Project Objectives**	**Geographic Coverage**

UNCTAD/UNDP	Environmental management of natural resource based sectors: the case of fisheries and tourism	Sep-96	.	grant	RIA No.1	RIA No.1	.	Regional workshop to be held in Hanoi during July 1996, with some focus on environmental management	Hanoi
UNIDO	Elimination of harmful particles to the ozone layer in SEAFICO and SEAREE plants	1996?	497	grant	UNIDO	MOFI	Seaprifico	.	.
UNIDO	Safety for marine fisheries capture (VIE/92/048)	1993-1994	50	Grant	FAO	.	Ship design center	Investigate the proposal for safety in marine capture fisheries	.
UNDP	Agricultural Resources Conservation and Development Project in Quang Binh (VIE/96/007)	1997-02	1,440	Grant	PPC Quang Binh	PPC Quang Binh	VBARD	To increase the incomes of about 60,000 direct beneficiary households through project activities in 7 areas: irrigation rehabilitation; agricultural development; aquaculture development; sand dune fixation; rural road rehabilitation; institutional support; credit and saving services.	Quang Binh (Minh Hoa, Tuyen Hoa, Quang Trach, Bo Trach, Quang Ninh, Le Thuy Districts)
UNDP	* Aquaculture Development in the Northern Uplands (VIE/98/009)	1999-02	1,601	Grant	MOFI	DARD of Lai Chau, Son La, Hoa Binh	MOFI; FAO	To build local capacity based on community participation to enable poor remote ethnic minority groups to undertake a development programme in aquaculture.	Lai Chau (Tuan Giao, Sin Ho Districts); Son La (Thuan Chau, Song Ma Districts); Hoa Binh (Da Bac, Mai Chau Districts)
Donor	Project Title	Project date	Commitment (US$'000)	Grant/ Loan	Executing Agency (EA)	Implementing Agency (IA)	Co-implementing	Project Objectives	Geographic Coverage
UNDP	Environmental Management in Coastal Aquaculture	2000	375	Grant	MOFI	Ria No.1	.	Environmentally sustainable coastal aquaculture development in the North-Central Coastal region of	Thanh Hoa; Nghe An; Thua Thien-Hue

								Vietnam	
UNDP/FAO	National Strategy for Aquatic Animal Quarantine in Vietnam	2000	48	Grant	MOFI	Ria No.1	FAO	To support Government objectives for the aquaculture sector to contribute to food security, poverty alleviation and earning of foreign exchange. To assist Ministry of Fishery to obtain required technical assistance from FAO for the development of the national strategy and framework on aquatic animal quarantine and health certification in Vietnam	Nationwide
UNDP/UNIDO	Improving quality of marine processed products (VIE/87/002)	1990-1993	1,013	.	UNDP	UNIDO	Seaprodex	The project is based at SEAPRODEX in Ho Chi Minh city, to set up pilot activities for canning seafood	Ho Chi Minh city
UNDP/UNIDO	Strengthening the mecha-electrical cooling center of SEAPRODEX (VIE/87/001)	1991-1994	1,750	.	UNDP	UNIDO	Seaprodex	to turn the mecha-electrical cooling center into a service unit for the cooling industry	Ho Chi Minh city
UNDP/FAO	Freshwater Aquaculture Extension (VIE/93/001)	1994-1996	397	Grant	FAO	NACA	.	Dissemination of techniques and extension services in Aquaculture	Northern provinces
Donor	**Project Title**	**Project date**	**Commitment (US$'000)**	**Grant/ Loan**	**Executing Agency (EA)**	**Implementing Agency (IA)**	**Co-implementing**	**Project Objectives**	**Geographic Coverage**
UNDP	Meeting on development of fisheries sector in	1992	89	grant	UNDP	MOFI	.	Calling for investment in the fisheries sector in Vietnam	Hanoi

	Vietnam (VIE/92/005)								
UNDP/FAO	Producing hormone to increase fish breeding (VIE/88/005)	1991-1994	715	grant	UNDP	FAO	MOFI	Upgrade material facilities to produce HCG and pilot production of LHRH, training staff for NASCO	
UNDP/FAO	Farming and processing of Seaweed (VIE/86/010)	1990-1992	1,045	Grant	UNDP	FAO	DOFI	Upgrade the center for farming and processing of seaweeds in Thua Thien Hue and construct a plant to produce industrial agar	Thua Thien Hue
UNDP/FAO	Shrimp seedling and brackish water aquaculture development in Nghia Binh (VIE/83/002)	1987-1989	901	grant	UNDP	FAO	DOFI	Increase shrimp production, transfer of small scale hatchery models and provide shrimp larvae	Nghia Binh
UNDP/FAO	Freshwater aquaculture research (VIE/86/001)	1989-1992	1,140	grant	UNDP	FAO	Ria No.1	Increase the research capacity of Ria No.1 and transfer of technology to 24 provinces	Ria No.1
West-East-South Programme	Institutional strengthening for sustainable aquaculture development in the Mekong delta of Vietnam	1995-1997	.	grant	.	Can Tho University	.	Involving the Fish Culture Research Institute, Hungary and Faculty of Fisheries, Can Tho University.	Can Tho

Annex 9: Reference List of Documents on Poverty and Aquaculture/Fisheries in Vietnam.

Raymon van Anrooy
Fisheries and aquaculture economist
FAO of the UN
3 Nguyen Gia Thieu str.
GPO box 63, Hanoi, Vietnam
Phone:(84)-(4)-8257208 and Fax: (84)-(4)-8259257
E-mail: raymon@un.org.vn

The following provides a list of selected documents on aquaculture, fisheries and poverty alleviation in Vietnam. An expanded list is also available at the following internet address: www.un.org.vn/fao/programme/sapa.htm

Reference List

TITLE	YEAR OF PUBLICATION AND AUTHOR	TYPE OF DOCUMENT AND SOURCE	KEY WORDS
Report of second Mission on Aquaculture and Environment (STS/TSS-2)	1997, Barg,-U.	FAO/UNDP Proj. Freshwater Fish Culture Ext. Hanoi (Viet Nam) Bangkok-Thailand FAO 1997 24 pp	Role of aquaculture in food supply, constraints to sustainable aquaculture, socio-economic studies of VAC system
An assessment of alternative strategies for the integration of pond aquaculture into the small-scale farming system of North-east Thailand	1998, Setboonsarng,-S.; Edwards,-P.	Aquaculture-Economics-and-Management [Aquacult-Econ-Manage] 1998 vol. 2, no. 3, pp. 151-162	Linear programming used to explain contribution of different aquaculture systems to the livelihood of small-scale farmers in Thailand
Bangladesh, Cambodia, China, Indonesia, Laos, Myanmar, Thailand and Viet Nam. Increasing benefits from inland fisheries and aquaculture in Asia	1998, Kapetsky,-J.M.	FAO, Rome [Italy] Technical report is provided of a study conducted under TSS-1	Investigation of the potential of small-water bodies in increasing fish yields and improving income and nutrition amongst rural populations
Socioeconomic	1996, Garces,-	Department of	The findings are presented

analysis of fish farming households in the Mekong Delta region: Some preliminary findings	A.L.; Sinh,-L.X.	Mariculture, Cantho University, Cantho, Vietnam, WES-Newsl. 1996 no. 4, pp. 11-12	of a study conducted to investigate the socioeconomic conditions of small farmers in the Mekong Delta Vietnam, in view of the prospects for the widespread adoption of integrated farming systems, particularly the integration of aquaculture
Sustainable aquaculture development in the Mekong Delta of Vietnam	1996, Varadi,-L.	Fish Culture Research Institute, PO Box 47, H-5541 Szarvas, WES-Newsl. 1996 no. 4, pp. 1-6	Following a brief account of the natural resources of the Mekong Delta in Vietnam, an examination is made of the dietary importance of aquaculture products
The effects of aquaculture on farm household economy: a case study in Omon District, Cantho Province, Vietnam	1996, Le-Xuan-Sinh	Faculty of Fisheries, University of Cantho, Cantho, Vietnam, Naga 1996 vol. 19, no. 1, pp. 50-52	A study of the farming systems in the Mekong River Delta (Vietnam) indicate that fish culture brings to the household a higher level of net farm income and family labor use
Women in a Vietnamese state farm earn nearly half of family income	1996, Ba,-V.T.N.; Hien,-T.T.T.	Seminar on Women's Role in Fisheries in Indo-China Phnom Penh (Cambodia) [1996], Aquac.-Asia. 1996 vol. 1, no. 2, pp. 42-43	Study about the role of women in farm activities. Women's income accounted for 47% of total family income; they had an important role in aquaculture, livestock raising, gardening, and food processing.
Rice with fish culture in the semi-deep waters of the Mekong Delta, Vietnam: A socio-economical survey	1998, Rothuis,-A.J.; Nhan,-D.K.; Richter,-C.J.J.; Ollevier,-F.	Lab. Ecol. and Aquaculture, Zoological Inst., Catholic Univ.Leuven, Belgium AQUACULT.-RES. 1998 vol. 29, no. 1, pp. 47-57	Study shows that the main beneficial effects of rice-fish culture are thought to be related to environmental sustainability, system biodiversity, farm diversification and household nutrition.
A comparison of traditional and modified inland artisanal aquaculture systems	1997, Edwards,-P.; Little,-D.C.; Yakupitiyage,-A.	AIT, Thailand. SO: AQUACULT.-RES. 1997 vol. 28, no. 10, pp. 777-788	It is proposed that the term 'small-scale' be used rather than 'artisanal' because of increasing farmer interest in income rather than subsistence, because of

			increasing use of off-farm inputs, and because of the increasingly important role of science in the promotion of such systems
The Spratly Islands: A marine park?	1994, McManus,-J.W.	AMBIO 1994 vol. 23, no. 3, pp. 181-186	Study about islands which are of growing importance in replenishing over-harvested stocks and which provide food and livelihood to coastal villagers in the Philippines, Taiwan, mainland China, Vietnam, and Malaysia.
Agriculture: towards 2010	1993, FAO	Report of the27th conference of FAO. Sess. 27, Rome (Italy), 6-25 Nov 1993	Agriculture development trends in general (including aquaculture) and the function of agriculture in the food supply and the alleviation of poverty is discussed,.
Local use of selected wetland resources: Cau Day Estuary, red River Delta, Vietnam	1998, Nielsen S., Pedersen A., Le Trong Trai, Le Dinh Thuy	Wetlands International	Describes present status of natural resources, fish and shellfish in Wetland, and describes the important role of the resources in generating income and food for rural families in the coastal zone.
VAC ecosystem and models of productive VAC in Vietnam	1994, Nguyen Ngoc Triu, Vacvina	Vacvina association, Vietnam on the occasion of the int. meeting on rural household food security, 16-19 Nov. Hanoi, Vietnam	The benefits of VAC (vegetation, aquaculture, and cattle/cage) farming combinations are discussed and the importance of all three activities is stressed for improvement of the economic situation of the farmers.
A study on aid to the environment sector in Vietnam	1999, IUCN- The world conservation Union, Vietnam	UNDP and Ministry of Planning and Investment (MPI) initiated study	Study discusses aid support to the various sectors, including fisheries, and the relation to the environment. Stresses the need for institutional coordination in the development.
Socio-economic status of women in coastal mangrove areas –trends to improve their life and	1998, Centre for natural resources and environmental studies (CRES)	Proceedings of the national workshop 31 Oct. – 4 Nov. 1997, Hanoi. CRES, Vietnam National University	Agro-fishery systems and other models are discussed and their (potential) influence on women's livelihood in coastal areas

environment			in Vietnam is investigated.
Sustainable aquaculture for small scale farmers: need for a balanced model.	1996, Edwards, P.; Demaine, H.; Innes-Taylor, N.; Turongruang, D	Outlook on Agriculture; vol. 25, no. 1; pp. 19-26, 1996	The paper outlines Asian Institute of Technology (AIT) experience in promoting sustainable aquaculture systems for small scale farmers, with emphasis on experience in Thailand
Effect of aquaculture on farm household economy: a case study in Omon District, Cantho Province, Vietnam.	1996, Le Xuan Sinh	Naga, v. 19(1) p. 50-52 Jan 1996	A study of the farming systems in the Mekong River Delta indicate that fish culture brings to the household a higher level of net farm income and family labor use
Socioeconomic analysis of fish farming households in the Mekong Delta region: Some preliminary findings	1996, Garces, A.L.; Sinh, L.X.*	WES Newsl; no. 4, pp. 11-12; 1996	Results of the survey indicated that the integrated farms are economically better off than the non-integrated, and that farm income and total household income in general are also higher in the integrated farms
Women in a Vietnamese state farm earn nearly half of family income	1996, Ba, V.T.N.; Hien, T.T.T.	Seminar on Women's Role in Fisheries in Indo-China, Phnom Penh (Cambodia), [1996] :/www.agri-aqua.ait.ac.th/naca	Women's income accounted for 47% of total family income; they had an important role in aquaculture, livestock raising, gardening, and food processing.
A Participatory Poverty Assessment	1996, Action Aid	A Participatory Poverty Assessment, in partnership with Ha Tinh province, World Bank and DFID, Hanoi	Keywords: rural poverty, Ha Tinh Province, poverty alleviation.
Economic and Social Characteristics and Farm Management Practices of Farms in the Brackishwater Region of Soc Trang and Bac Lieu Provinces, Mekong delta, Vietnam	1999, Brennan, Donna et al	Results of a 1997 Survey. ACIAR Project "An Evaluation fthe Sustainability of Farming Systems in the Brackish Water Region of the Mekong Delta	Not available
Geographical, Social and Socio-economic Assessment of the Fishery Industry in	1996, Carl Bro Management a/s	Fisheries Master Plan Sub-Project II. Final Report, Ministry of	This study divided Vietnam in several areas to identify which activities are carried

Vietnam.		Fisheries and Danida, Copenhagen	out in the fishery sector.
Sector Programme Support Document for Danida Support to the Fisheries Sector, Vietnam.	1998,Carl Bro International a/s	Final Draft Report, Ministry of Foreign Affairs, Danida, Copenhagen	Project document of fisheries project
SPS Component Description for Support to Freshwater Aquaculture Development, Vietnam	1998, Carl Bro International a/s	Final Draft Report, Ministry of Foreign Affairs, Danida, Copenhagen	Project document of fisheries project
SPS Component Description for Strengthening of Fisheries Administration (STOFA)	1998, Carl Bro International a/s	Vietnam. Draft, Ministry of Foreign Affairs, Danida, Copenhagen	Project document of fisheries project
The Relationship between Mangrove Reforestation and Coastal Aquaculture on Vietnam,	1997, CRES – ACTMANG	Proceedings of the National Workshop, Hue City, October31-November 2, 1996. Hanoi	Not available
Socio-economic Status of Women in Coastal Mangrove Areas -Trends to Improve their Life and Livelihood,	1998, CRES - ACTMANG	Proceedings of the National Workshop, Hanoi, Hue City, October 31-November 4, 997. Hanoi	Not available
Capacity Development for Poverty Elimination, Ben Tre Province	1998, Currie, D.J.	Final Report of the International Aquaculture Consultant, LNDP VIE 96/005, LNDP	Keywords: Aquaculture, poverty alleviation, socio-economic situation
Supporting Environmentally Sound Natural Resource Issues in Viet Nam	1994, Danida	Fact Finding and Project Identification Report, Copenhagen	Not available
Assessment of the Living Marine Resources in Vietnam. ALMRV Phase II.	1998, Danida	Project Document. Ministry of Foreign Affairs, Copenhagen	Project document of fisheries project
Technical Working paper on Rural	1998, Danida	Copenhagen	Keywords: credit, aquaculture

Financial Services			
Agriculture in Post Transition Vietnam: Challenges and Opportunities.	1995, FAO	TSS Report:VIE/95/0 iT. FAO and UNDP, Hanoi	Report of development project on agricultural transition
Coastal and Marine Environmental Management in the South China Sea (East Sea) Phase 2. Socialist Republic of Vietnam	1999, GEC/WWF and Wetlands international	Technical Annex 1. Coastal and Marine Community Survey Report, Asian Development Bank	Not available
Statistical Data on Agriculture, Forestry and Fishery 1985-1995.	1996, General Statistical Office	Statistical Publishing House, Hanoi	Not available
Statistical Yearbook 1998.	1999, General Statistical Office	Statistical Publishing House, Hanoi	Not available
Results of the Socio-economic Survey of Households 1994-1997.	1999, General Statistical Office	Statistical Publishing House, Hanoi	Not available
Viet Nam Living Standards Survey 1997-1998.	2000, General Statistical Office	Statistical Publishing House, Ha Noi	Not available
Aquaculture for Rural Development in Vietnam	2000, Le Thanh Luu	FAO, Hanoi	Discussion paper for the Sustainable Aquaculture for Poverty Alleviation (SAPA) scoping meeting in Hanoi, May 2000
Rural Development Strategy. Draft,	1998, Lincoln International	Ministry of Agriculture and Rural Development and LNDP, Hanoi	Not available
Poverty Alleviation	1995, Messier, Marcel J-G	Hanoi	Not available
A study on aid to the environment sector in Vietnam,	1999, Ministry of Planning and Investment	AMPI and LNDP, Hanoi	Not available
Rural Development in Vietnam	1999, National Centre for Social Sciences and Humanities and University of British Columbia	Social Science Publishing houes, Hanoi	Not available
Tra Vinh. A Participatory Poverty	1999, Oxfam (GB)	Tra Vinh province, World Bank and DFID,	Assessment study to find out what is the present

Assessment,		Hanoi	status of poverty and what are the needs of the poor in the Tra Vinh province.
Vietnam Attacking Poverty, Vietnam Development Report 2000	2000, Poverty Working Group	Joint Report of the Government of Vietnam -Donor -NGO Poverty Working Group, World Bank, Hanoi	Report based on the earlier assessment studies and used as background for the national strategy for poverty alleviation in Vietnam till the year 2010.
Socialist republic of Vietnam. Technical, Financial and Economic Assessment of Capture Fisheries and Aquaculture in Vietnam	1996, Ramboll	The Master Plan Sub-Project 1, with VKI, Denconsult and Alliance Consulting Co, Ltd.., Ministry of Fisheries and Danida	Report as part of the Masterplan for Fisheries till the year 2010.
Coastal Wetlands, Protection and Development Project, Lower Mekong, Vietnam	1998, Ramboll	Final Draft Report from the Danida Participation in World Bank Pre-Appraisal Mission, Ministry of Foreign Affairs and Danida, Copenhagen	Not available
Socialist republic of Vietnam. Technical, Financial and Economic Assessment of Capture Fisheries and Aquaculture in Vietnam	1999, Ramboll	The Master Plan Sub-Project 1. Final Report and Annexes, with VKI, Denconsult and Alliance Consulting Co, Ltd.., Ministry of Fisheries and Danida	Report as part of the Masterplan for Fisheries till the year 2010.
Addressing the Health and Education Needs of ethnic Minorities in the Greater Mekong Sub-Region.	2000, Research Triangle Institute	Vietnam Country Report.. ADB TA No 574 Reg, Hanoi	Keywords: Mekong delta, poverty, etnic minorities, health, education
Ho Chi Minh City. A Participatory Poverty Assessment	1999, Save the Children (UK)	HO Chi Minh City, the World Bank and DFID, Hanoi	Assessment study to find out what is the present status of poverty and what are the needs of the poor in the Ho Chi Minh city.
Vietnam. Coastal Aquaculture Sector Review.	1996, SCP Consultants	Final Report. Asian Development Bank TA No-23 82-VIE, Sydney	Not available
Socio-economic Development and Investment Requirements for the Five Years 1996-2000	1995, Socialist Republic of Vietnam	Government Report to the Consultative Group Meeting. Paris	Not available

Vietnam's Country Report on Social Development. For the World Summit for Social Development	1995, Socialist Republic of Vietnam	Copenhagen, March 6-12, 1995. Hanoi	Not available
Catching Up. Capacity Development for Poverty Elimination in Viet Nam.	1996, United Nations Development Program (UNDP)	UNDP and UNICEF, Hanoi	Not available
Strengthening Capacity for the Renewal of Rural Development in Viet Nam (Phase 1).	1998, UNDP	Mapping Poverty and Agro-ecological Potential In Viet Nam, prepared by Lincoln International in association with ANZDEC Ltd and IFPRI	Not available
Strengthening Capacity for the Renewal of Rural Development in Viet Nam (Phase 1).	1998, UNDP	Concepts and Levels of Poverty. Methodology - Measurement - Criteria, prepared by Lincoln International in association with ANZDEC Ltd and IFPRI	Not available
Expanding Choices for the Rural Poor. Human Development in Viet Nam.	1998, UNDP	Hanoi	Not available
Environmental Management in Coastal Aquaculture.	2000, UNDP	V1E97/0303/A/01/NEX. Project Document, Hanoi	Project document on Aquaculture management in 3 provinces in Vietnam
Lao Cai, participatory poverty Assessment	1999, Vietnam-Sweden Mountain Rural Development Program	Lao Cai province, World Bank and DFID, Hanoi	Assessment study to find out what is the present status of poverty and what are the needs of the poor in the La Cai province
Eco-Technological and Socio-economic Analysis of Fish Farming Systems Lao Cai	1997, West-East-South Program	A Participatory Poverty Assessment in the Freshwater Area of the Mekong Delta 1996-1997. Can Tho	Not available
Advancing Rural Development in Vietnam..	1998, World Bank	Vision and Strategy for Action, Preliminary Draft, Washington	Not available
Vietnam. Advancing Rural Development.	1998, World Bank	From Vision to Action, in collaboration with Government of Vietnam, ADB, UNDP, FAO and CIDA, Hanoi	Not available

Voices of the Poor	1999, World Bank and DFID	Action Aid, Oxfam (GB), Save the Children (UK) and Vietnam-Sweden MRDP, Hanoi	Study discussing the needs of the poor in Vietnam.
Coastal Aquaculture: searching for sustainable management	2000, Tran Van Hnuong	Research Institute for Aquaculture No.1 Thesis	This study covers some case studies in North and North central Vietnam, discussing the sustainability of aquaculture practices.
Vietnam : Poverty assessment and strategy	1995, Prescotte N.; Litvack, J.	World Bank.	Keywords: Rural development, social and macroeconomic issues and poverty assessment
Gender and poverty in Vietnam.	1994,Fong, M. S.	Washington. World Bank. ESP Discussion Paper Series. No 48	Keywords: gender, poverty, Vietnam
Towards a process-oriented rural development strategy for foreign Assistance in Vietnam : A concept paper for discussion.	1995, Cox, M	Worldbank, IDA	Keywords: rural development, poverty, Vietnam
Agrarian transition in Vietnam.	1998, Jamal, Vali; Jansen, Karel	ILO, Geneva	Keywords: agrarian reform, poverty, macro level impact
Localized poverty reduction in Vietnam: Improving the enabling Environment for livelihood enhancement in rural areas.	1999, Hainsworth, G. B.	Vancouver (Canada). Centre for South East Asia Research.	Keywords: poverty reduction, rural development, community development, public policy, Vietnam
A synthesis of participatory poverty assessments from four sites in Vietnam : Lao Tai, Ha Tinh, Tra Vinh and Ho Chi Minh city.	1999, Anonymous	Worldbank and DFID	Assessments of 4 provinces bundled to get an overview of the situation in Vietnam
VAC and vacvina : Vietnamese community action	1999, Vietnamese gardening	Hanoi	Keywords: VAC, VACVINA, Poverty, Hunger, Malnutrition,

program against poverty, hunger, malnutrition, environmental destruction.	association.		Environmental destruction
Consultative group meeting for Vietnam. Hanoi, Dec.14-15, 1999.	1999, Government of Vietnam	Hanoi	Keywords: poverty, employment, consultative group